

Vol. XVII

No. 8

DISSERTATION ABSTRACTS

*ABSTRACTS OF DISSERTATIONS AND
MONOGRAPHS IN MICROFORM*

UNIVERSITY MICROFILMS
ANN ARBOR, MICHIGAN: 1957



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TABLE OF CONTENTS

The Table of Contents lists in alphabetical order the principal subject headings of the dissertations abstracted. For the convenience of readers an alphabetical author index is included following the abstracts.

AGRICULTURE	1637
ANTHROPOLOGY.....	1644
BACTERIOLOGY	1647
BIOLOGY - GENETICS	1648
BOTANY.....	1649
CHEMISTRY	1653
ECONOMICS	1682
EDUCATION	1692
ENGINEERING.....	1717
FINE ARTS.....	1726
FOOD TECHNOLOGY.....	1727
GEOGRAPHY.....	1728
GEOLOGY.....	1729
HEALTH SCIENCES.....	1731
HISTORY	1733
LANGUAGE AND LITERATURE.....	1746
LIBRARY SCIENCE	1771
MATHEMATICS.....	1773
MUSIC	1778
PHARMACOLOGY	1780
PHILOSOPHY	1783
PHYSICS.....	1786
PHYSIOLOGY	1794

POLITICAL SCIENCE.....	1797
PSYCHOLOGY.....	1805
RELIGION.....	1821
SOCIAL PSYCHOLOGY.....	1831
SOCIOLOGY.....	1833
SPEECH — THEATER.....	1838
ZOOLOGY.....	1839
AUTHOR INDEX.....	1844

AGRICULTURE

AGRICULTURE, GENERAL

THE QUALITY OF SWEET POTATO CHIPS AS INFLUENCED BY VARIETY, METHOD OF PREPARATION, AND STORAGE CONDITION OF THE ROOTS

(Publication No. 21,984)

David Lee Burton, Ph.D.
Louisiana State University, 1957

Supervisor: Dr. Lloyd G. Jones

Most of the publications on the production of sweet potato chips are of a general nature, and high quality chips could not be produced consistently by following the general instructions given. The primary objective of this research was to develop a specific method for preparing sweet potato chips of high quality which could be adapted to commercial production. The quality of sweet potato chips as influenced by variety, method of preparation, and storage condition of the roots was studied in experiments by the writer.

It was found that the optimum frying temperature of sweet potato chips made from freshly-cured roots consisted of a starting temperature of 300° F for 2 minutes and a finishing temperature of 275° F for 3 to 4 minutes. The optimum slice thickness before frying was found to be 1-32 inch. The chips prepared from cured roots stored for 27 weeks at 60° F and cooked at a starting temperature of 287° F for 2 minutes and a finishing temperature of 275° F for 3 minutes were higher in quality than chips fried under other conditions. Medium-sized roots of the Gold-rush variety and small-sized roots of the Unit I Porto Rico variety were found to be optimum in size for making chips, with no real difference being shown between these samples.

From a chip quality standpoint it was noted that pre-heating the roots in 175° F water bath for 30 minutes was superior to other pre-heating conditions tested, regardless of the curing and storage conditions of the roots. It was shown that chips packaged in sealed double cellophane bags were superior in color to chips packaged in sealed glass jars after 6 weeks of storage at room temperature. Chips fried in anti-oxidant treated cottonseed oil were generally superior in color to chips fried in untreated oil. Among 5 different frying fats tested there was no significant effect on the quality of freshly-prepared chips.

The degree of browning of the chips was increased by increasing the cooking temperature and the length of the cooking time. Pre-heating the roots prior to chip preparation usually increased the degree of browning and moisture content of the chips. There was no consistent effect of storage condition or pre-heating treatment of the roots on the oil content of chips. It was noted that the higher the pre-heating temperature of the roots the higher the reducing and total sugar contents of the chips, regardless of the storage condition of the roots. Throughout the storage period the effect of the pre-heating treatment of the roots

on the sugar content of the chips was so pronounced as to mask most of the effects which the storage condition of the roots might have had in this regard. There were indications that pre-heating the roots increased the total pigment content of the chips. Apparently, the type of frying fat affected the total pigment content of the chips. It was found that approximately 27 per cent of the total pigment of the sliced roots was lost during the frying process, using cottonseed oil as a frying fat.

197 pages. \$2.60. Mic 57-2623

BROMINE RETENTION IN SOILS AND UPTAKE OF BROMINE BY PLANTS AFTER SOIL FUMIGATION

(Publication No. 21,388)

Zenobius Stelmach, Ph.D.
Michigan State University, 1955

The study of bromine retention by some soils and uptake of bromine and its effect upon plants was carried out in the field and in the greenhouse.

Hillsdale, Brady and Houghton soils were used in field study, and Brookston, Oshtemo and Houghton soils were used in the greenhouse.

Plots of Hillsdale soil were treated with the following fumigants in the amount corresponding to the rate per acre: methyl bromide, 435 pounds; sodium bromide, 475 pounds; ethylene dibromide W-85, 9 gallons; and untreated-check.

Whole bean plants, bean pods and soils from Hillsdale soil were sampled at three-weekly intervals and analyzed for total and water extractable bromine, respectively.

Plots of Brady soil were treated with 435 pounds of methyl bromide, 9 gallons of ethylene dibromide W-85, and check. All rates were based on acre basis and all treatments randomized and replicated. Beans and table beets were grown on Brady soil and two samplings of plants and soils were taken for total bromine analysis.

On Houghton soil table beets were planted and soil treatment was the same as for Brady soil.

In the greenhouse surface samples of Brookston, Oshtemo, and Houghton soils were treated with sodium bromide at the rate of 108.8 pounds of sodium bromide per acre. Two samplings of plants and soils were taken for analysis.

All bromine analyses were done by method described by Shrader, et al.

Bean and cabbage plants grown on Hillsdale soil accumulated a considerable amount of bromine during the early stage of growth, but with the progress in growth this amount decreased markedly. The same was true with water extractable bromine of soil which tended to diminish also. An exception was soil treated with sodium bromide in which there was a considerable accumulation of bromine during growing season.

The yield of bean pods rated decreasingly: W-85,

check, Mc-2, NaBr; that of cabbage was affected in exactly the same way as above; yield of potatoes: Mc-2, W-85, check, NaBr; and yield of peanuts: W-85, Mc-2, check, and NaBr.

In Brady soil the highest amount of total bromine was in methyl bromide treated plots, and it was the highest also in bean pods and beets from corresponding plots.

Yield of beans and table beets was as follows from highest to lowest: ethylene dibromide, methyl bromide, and check. A quality rating of table beets was as follows: ethylene dibromide, methyl bromide, and check. On Houghton muck, however, the yield of beets from methyl bromide treated plots was the highest, and that from plots treated with ethylene dibromide was the lowest because of reduced stand caused by damping-off fungi.

There were significant increases in yield of bean pods and table beets grown in greenhouse in soils treated with sodium bromide. No significant differences were found in the amount of bromine present in either plant tissue or soil, or in the yield, due to high or low soil moisture contents.

The highest native content of bromine was in Oshtemo, next in Brookston, and the lowest was in Houghton soil. The highest and most significant retention of bromine was in Houghton, the lowest in Oshtemo, and it was intermediate in Brookston soil.

In the dry year 828 ppm of bromine in bean plants grown on sodium bromide treated plots, on Hillsdale soil, seemed to depress growth of plants, whereas in the year with adequate rainfall 866 ppm found in bean pods near maturity did not cause any harm to plants and resulted in a higher yield of beans than from untreated plots.

In the field experiment 975 ppm of bromine in beets and 176 ppm in Houghton muck, found in samples taken on September 25, 1954, were harmful to beet's development. On the other hand, as much as 1062 ppm of bromine in beets, grown in the greenhouse, did not cause any damage.

In bean plants grown on soil not treated with bromine, the highest content of bromine was in stems, next in roots, and the lowest was in leaves. In bean plants from treated plots the highest amount of bromine was in roots, lower in leaves, and the lowest in stems.

99 pages. \$2.00. Mic 57-2624

AGRICULTURE, AGRONOMY

INHERITANCE OF SEVERAL ECONOMIC QUANTITATIVE CHARACTERS IN RICE

(Publication No. 21,983)

Charles Nelson Bollich, Ph.D.
Louisiana State University, 1957

Supervisor: Professor M. T. Henderson

Improvement in rice is no longer dependent on foreign introductions, mass selection and the pure line method but rather on breeding methods based on controlled hybridization by selection. In order for such methods to be most effective, an understanding of the inheritance of those

characters for which improvement is sought is essential. This study was an attempt to add further to the knowledge concerning the inheritance of the more important economic characters in rice.

A genetic analysis of spikelet length, spikelet breadth, and date of heading and general observations concerning inheritance of yield were conducted in the parents, F_1 , F_2 , F_3 and F_4 generations of a cross between a commercial variety and an advanced selection. The principal information sought related to the nature of inheritance, number of genes involved and heritability.

Spikelet length was quantitative in nature, and the difference in the parents of 0.6 mm. appeared to be governed by at least 2 and probably 3 or more factors. Transgressive segregation for both long and short spikelet length occurred. The heritability estimate based on F_2 data was 86 per cent and that based on the regression of F_3 lines on F_2 plants was 67 per cent. The correlation coefficient between F_2 and F_3 was 0.72.

Spikelet breadth was also quantitative in nature. Partial dominance of narrow over broad spikelet was observed. The parent difference of 0.49 to 0.75 mm. appeared to be controlled by more than 3 but probably not more than 4 or 5 pairs of genes. The heritability estimate based on F_2 data was 58 per cent, that based on the regression coefficient 64 per cent, and the correlation coefficient between F_2 and F_3 was 0.71.

The character date of heading possessed features of both a quantitative and qualitative nature. Earliness showed a high degree of partial dominance over lateness. The parent difference of 43 days appeared to be controlled by 1 major pair of genes and a number of modifying genes. Heritability of this character, as measured by regression of F_4 lines on F_3 lines, was 63 per cent. The correlation coefficient between F_2 plants and F_3 lines was 88 per cent. A related character, date of last heading, gave a heritability estimate of 82 per cent, as determined by regression of F_4 lines on F_3 lines.

Yield of grain behaved in a quantitative manner, and exhibited a strong degree of transgressive segregation for high yield, 20 per cent of the F_4 lines yielding significantly higher than the high yielding parent. Yield and date of heading were closely associated, $r = -0.61$, with all late heading lines being low in yield, in contrast to the early lines, most of which were high in yield. The evidence suggested that genes for high yielding ability were not expressed when combined with genes for lateness. The data indicated yield to have a very low heritability, even when selection is practiced on an F_3 line basis.

Correlation coefficients between yield and spikelet length, spikelet breadth, weight of grain and volume weight of grain were not significant.

143 pages. \$2.00. Mic 57-2625

AGRICULTURE, ANIMAL CULTURE

IDENTIFICATION OF SOME OFF-FLAVOR COMPOUNDS FROM GAMMA RADIATED SKIM MILK

(Publication No. 20,954)

Edgar Allan Day, Ph.D.
The Pennsylvania State University, 1957

The flavor and odor defects of gamma radiated skim milk were characterized as malty, caramel-like, and slightly putrid. Attempts to identify the responsible compounds were carried out by studying skim milk and various fractions therefrom when radiated with gamma rays at either 2×10^6 or 5×10^6 rep. After certain preliminary observations were made, the study was confined to skim milk and aqueous sodium caseinate systems.

The off-flavor and odor volatiles were recovered from radiated samples by distillation at 20 to 30 mm. mercury pressure and temperatures not exceeding 40°C . The evolved vapors were crudely fractionated and collected by a series of traps cooled by wet ice, ethanol-dry ice, and liquid nitrogen respectively. Large concentrations of the volatiles were collected free of water in the liquid nitrogen cooled traps. The distillates so obtained then were available for subsequent qualitative analysis.

Identification of compounds in distillates from radiated samples of skim milk, sodium caseinate, and their respective untreated controls was based on the following evidence. The retention volumes of peaks arising in gas chromatograms of the volatile distillates were compared with those produced by authentic compounds on gas-liquid partition columns containing 30 percent "Carbowax 400" supported on 30 to 60 mesh firebrick, dinonylphthalate-firebrick (1:2 w/w), and paraffin oil-firebrick (1:2 w/w). The fractionated volatiles from gas-liquid columns containing "Carbowax 400" as the immobile solvent were analyzed by mass spectrometry. Identification of carbonyls also was accomplished by paper chromatography of their 2,4-dinitrophenylhydrazone derivatives.

Methyl sulfide, acetaldehyde, acetone, butanone, methyl alcohol, and ethyl alcohol were identified in the volatiles of skim milks radiated at 2×10^6 and 5×10^6 rep. The amounts of identified compounds increased with an increase in radiation dosage. Methyl mercaptan, methyl sulfide, acetaldehyde, acetone, butanone, and ethyl alcohol were identified from aqueous three percent sodium caseinate sols radiated at 2×10^6 rep. Acetone was the only volatile compound revealed in control skim milk and caseinate samples.

In view of known flavor threshold values for carbonyl and sulfur compounds and the mild odors exhibited by methyl and ethyl alcohol, it was concluded that of the compounds identified in radiated skim milk, methyl sulfide and acetaldehyde were the only compounds of off-flavor significance. Both compounds exhibited a malty-type flavor when added to raw skim milk.

Of the compounds identified in volatiles from radiated sodium caseinate, methyl mercaptan was the most important off-flavor and odor contributor. This compound was characterized organoleptically as putrid and on the order of cooked cabbage. Radiated caseinate preparations were criticised similarly. Methyl sulfide and acetaldehyde were considered of minor importance to the odor and flavor of this medium.

Organoleptic observations on radiated skim milk consistently suggested the presence of methyl mercaptan and G7812 methyl disulfide. The fact that these compounds were not conclusively identified does not eliminate them as off-flavor and odor contributors. In view of the small amounts required to produce flavor and odor defects, the amounts present in radiated skim milk could have been easily detected organoleptically, yet not by the techniques used for isolation and identification.

97 pages. \$2.00. Mic 57-2626

PERFORMANCE AND CARCASS CHARACTERISTICS IN INDIVIDUALLY FED STEER AND HEIFER CALVES

(Publication No. 20,209)

Amos Paul Kennedy, Sr., Ph.D.
Michigan State University, 1955

A series of three experiments was conducted cooperatively by the Michigan Agricultural Experiment Station and the Bureau of Animal Industry of the United States Department of Agriculture to study some of the production factors and carcass characteristics in fattening steer and heifer calves. Data were obtained on twelve steers and twelve heifers, and on the carcasses of the same animals in each of the three experiments. Cattle were slaughtered at four different stages of finish in an attempt to match the two sexes for fatness and grade.

The average initial weights for steers and for heifers were 384 and 367 pounds, respectively. Slaughter weights in Kill 4, after 275 days of feeding, averaged 892 and 816 pounds. Cattle of both sexes maintained high and similar rates of gain early in the feeding period. Heifer gains decreased after the first 84 days of feeding, while steers maintained a high rate of gain for 140 days. The rate of gain for heifers decreased at a faster rate than that of steers. The difference in rate when cattle were matched for finish was very small and was not significant.

During the first 112 days of feeding the daily total digestible nutrient consumption for all cattle increased rapidly and showed small differences between the sexes. After 112 days the daily total digestible nutrient consumption of steers remained almost level, while that of heifers decreased as feeding progressed beyond this point. Total digestible nutrients required per pound of gain was higher for heifers than for steers fed a similar time, however, when cattle were matched for finish at slaughter small differences were observed.

Slaughter grades, carcasses grades and dressing percentages increased significantly in all cattle as feeding progressed, and each was significantly higher for heifers when cattle were compared by kills, but with similar finish the differences between the sexes were small and none were significant.

Carcass separable fat, separable fat in most wholesale cuts and ether extract content of carcass boneless meat, each increased as feeding progressed. The percentages of lean and bone in the carcass and in most wholesale cuts, along with the percentages of protein and moisture in carcass boneless meat decreased with increasing fatness, and these factors were significantly higher in steer carcasses

when cattle were compared by kills. However, when cattle were matched according to finish the differences between the two sexes were small and most of the differences were not significant.

The carcass percentages of flank, kidney knob and rib cuts increased significantly with finish in all cattle while percentages of round and shank decreased significantly. Degree of finish had no significant effect on the percentages of loin, rump, plate and chuck in cattle carcasses.

Factors that were influenced by sex were carcass percentages of hindquarter, flank and flank fat, and meat to bone ratio, which were significantly higher in heifer carcasses both when cattle were compared by kills and matched by finish; and the percentages of forequarter, chuck, chuck bone, shank, shank bone and total carcass bone, being significantly higher in steer carcasses.

Wholesale cuts not significantly associated with sex as percentage of carcass when matched by finish were the loin, rib, round, rump and plate.

The four measures of finish used in these experiments showed steers and heifers to be closely matched for finish when steers were fed approximately 50 days longer than heifers.

109 pages. \$2.00. Mic 57-2627

GROWTH PATTERNS WITHIN SOME INBRED LINES OF CHESTER WHITE AND YORKSHIRE BREEDS OF SWINE

(Publication No. 21,303)

Terrell L. Noffsinger, Ph.D.
Purdue University, 1957

Major Professor: F. N. Andrews

This work was initiated to study growth and backfat deposition in inbred Yorkshire and inbred and crossbred Chester White lines of swine. Criteria for growth and backfat deposition were rate of gain, determined weekly, and average backfat thickness at individual live weights of 100 pounds, 125 pounds, 150 pounds, 175 pounds and 200 pounds. Slaughter and cutout data were obtained on barrows from each line.

Observations were made on 141 animals representing five different lines of breeding. More than 8,500 individual backfat measurements are included in the study. Measurements of backfat along the topline as well as around the circumference of the individuals were made. During Trial 3 measurements of total tissue thickness over the scapula were made at a live weight of 175 pounds.

Ninety-seven barrows and gilts from four lines of inbred and crossbred swine were used in Trial 1. They were allowed access to alfalfa-ladino pasture and were fed free-choice throughout each of two test periods. Phase 1, or the first period of Trial 1, covered a period of eight weeks prior to an average weight of 100 pounds. Phase 2 covered the eight weeks subsequent to an average weight of 100 pounds. Nine pigs were used in Trial 2, which consisted of 5 White King barrows and 4 Yorkshire barrows. They were fed individually, free-choice, a complete mixed ration throughout the eight weeks of the trial. Pigs used in Trial 2 were in dry lot throughout the entire period of the experiment. In Trial 3 thirty-five pigs were

fed corn and Supplement V free-choice while on alfalfa-ladino pasture. Growth rate as measured in terms of weight gain was not significantly different between sexes or among lines during phase 1 of Trial 2. Growth rate was much higher in pigs of the White King line and White King-Boilermaker line than in either the Boilermaker or the Yorkshire lines during the last half of phase 2.

In Trial 2 Yorkshire barrows gained as rapidly and made as efficient use of feed as White King barrows. In Trial 3 White King and White King crossed pigs made more rapid gain than pigs of either the Boilermaker or Yorkshire lines.

Analyses of variance of the data for all weights, sex, lines and sites of measurement showed that the difference in backfat thickness due to weight was highly significant ($P < 0.01$). There were highly significant differences between lines ($P < 0.01$) and in backfat thickness at the different sites (i.e., shoulder, loin and ham). The Yorkshire swine of all weights had significantly less backfat than any of the other lines.

In Trial 1 there was little difference in backfat thickness between White King barrows and White King gilts at weights from 100 pounds to 175 pounds. At 200 pounds the barrows had approximately 0.10 inch more backfat. In the Yorkshire line the barrows had greater thickness of backfat at all weights. In Trial 3, with fewer numbers, the backfat of the White King gilts was greater at all weights, but the barrows and gilts of the Yorkshire line followed the pattern of Trial 1. When the data of all lines were combined the backfat thickness of barrows was significantly greater ($P < 0.01$) than that of gilts in Trial 1, but there was no significant difference in Trial 3. When data were combined for both trials barrows had significantly greater ($P < 0.05$) thickness of backfat at 175 pounds and significantly greater ($P < 0.01$) thickness of backfat at 200 pounds.

An attempt was made to obtain prediction equations for thickness of backfat using weight, age, rate of gain and various powers and combinations of those factors. By use of the digital computer coefficients were determined for the equation of the following form:

$$\hat{y} = b_1 X_1 + b_2 X_2 + \dots + b_n X_n$$

\hat{y} = thickness of backfat measured in millimeters

X_1 = weight in pounds

X_2 = age in days

X_3 = rate of gain in pounds per day

$X_4 = X_1 X_2$

$X_5 = X_1^2$

$X_6 = X_1^3$

$X_7 = X_1 X_2^2$

$X_8 = X_1^2 X_2$

$X^9 = X_1^3 X_2^2$

The computations were made by the Purdue University Statistical Laboratory personnel, using the Digital Computer.

The coefficients for the nine variables were determined for each sex of the White King line, White King-Boilermaker line and the Yorkshire line.

It was found that approximately 84 percent of the variation in backfat in barrows of the White King line could be accounted for by the nine variables mentioned. In other words, $R^2 = 0.8388$. When X_1 , X_2 and X_3 only were used in combination an R^2 of 0.82631 resulted. An R^2 of 0.82631 indicated that approximately 83 percent of the variation in backfat could be attributed to weight, age and rate of gain. Further analysis showed that the correlation between backfat and weight for White King barrows was 0.9072 or $R^2 = 0.82308$. Thus more than 82 percent of the variance in backfat thickness in White King barrows is attributable to weight alone. The equation of prediction for backfat assumed the form

$$\hat{y} = 0.13603 + 0.17476X_1 + 0.02296X_2 + 0.01664X_3$$

\hat{y} = predicted backfat in millimeters

X_1 = weight in pounds

X_2 = age in days

X_3 = rate of gain in pounds per day

The equation for White King gilts was

$$\hat{y} = 0.1420 + 0.1641X_1 + 0.0110X_2 + 0.0260X_3$$

Since the analysis of data for White King barrows showed 84 percent of variance in backfat could be attributed to the nine variables shown above and that weight alone accounted for more than 82 percent, it was decided to use only the straight line relationship between backfat and weight. The equations for the various lines for the summer of 1954 were:

White King barrows	$\hat{y} = 4.02 + 0.1976X$
White King gilts	$\hat{y} = 3.31 + 0.1889X$
Yorkshire barrows	$\hat{y} = 9.45 + 0.1263X$
Yorkshire gilts	$\hat{y} = 10.25 + 0.1041X$
White King-Boilermaker barrows	$\hat{y} = 12.60 + 0.1540X$
White King-Boilermaker gilts	$\hat{y} = 13.50 + 0.1440X$
Boilermaker barrows	$\hat{y} = 11.80 + 0.1605X$
Boilermaker gilts	none

Similar equations for Trial 3 were determined as follows:

Yorkshire pigs	$\hat{y} = 10.41 + 0.132X$
White King-Boilermaker pigs	$\hat{y} = 10.21 + 0.186X$
White King pigs	$\hat{y} = 9.40 + 0.183X$
White King X White King-Boilermaker pigs	$\hat{y} = 6.60 + 0.196X$
Boilermaker pigs	$\hat{y} = 7.10 + 0.196X$

Pigs of the White King line had the greater total amount of anterior pituitary thyrotropic hormone per unit of body weight and the Boilermaker pigs the least. Values of thyrotropic hormone content of pituitary glands from Yorkshire pigs were intermediate between those of White King pigs and Boilermaker pigs.

155 pages. \$2.05. Mic 57-2628

AGRICULTURE, PLANT CULTURE

A STUDY OF HEAVY METAL COMPLEXING BY SOIL ORGANIC MATTER AND ITS EFFECT ON THE UPTAKE OF HEAVY METALS BY PLANTS

(Publication No. 21,892)

Patrick Colin Butler, Ph.D.
North Carolina State College, 1957

Supervisor: Nathaniel Terry Coleman

The complexing of heavy metals by soil organic matter was studied in the laboratory and formation constants of various heavy metal-organic matter complexes were determined using the displacement of organic matter titration curves in the presence of heavy metal as an index of complexing. The stabilities of the complexes formed were found to be in the order: $Fe^{+++} > Pb^{++} > Ag^+ > Al^{+++} > Cu^{++}$. It was observed that complexing was accompanied by a decrease in the cation exchange capacity of the organic matter, indicating that the same functional groups in the organic matter are responsible for both cation exchange and the complexing of heavy metals. These functional groups are presumed to be chiefly carboxylic.

Greenhouse experiments were conducted using peat-sand mixtures to determine the availabilities of complexed metals to plants and to observe effects of heavy metals on each other. Three of the experiments involved varying levels of copper, manganese or pH at a single level of organic matter. It was found that increasing the level of copper applied decreased yields but increased copper contents of plants. Manganese contents were increased at all but the highest level of copper, which resulted in a marked decrease in manganese content. Increasing the level of manganese applied caused large increases in manganese contents but resulted in decreases in yield and in copper and iron contents. Increasing pH caused higher yields and lower plant contents of manganese, copper and iron.

The fourth experiment involved varying levels of copper, iron and organic matter at a single pH. Plant contents of copper and iron were determined, as were activities of ascorbic acid oxidase and cytochrome oxidase. The presence of organic matter depressed both copper contents of the plants and ascorbic acid oxidase activities, and there were indications of a direct relationship between copper content and ascorbic acid oxidase activity. Iron contents and cytochrome oxidase activities were increased by the addition of the lower level of organic matter but the higher level of organic matter resulted in values which did not differ from those obtained in the absence of organic matter. There appeared to be no relationship between iron content and the activity of either enzyme. Increasing the level of copper applied caused a decrease in the uptake of iron but iron applied had no effect on copper uptake.

116 pages. \$2.00. Mic 57-2629

EVALUATION OF TECHNIQUES FOR
STUDYING ROOT DEVELOPMENT OF
CORN (*ZEA MAYS* L.) PLANTS

(Publication No. 21,753)

Abraham Adeboyejo Agbolade Fayemi, Ph.D.
Kansas State College, 1957

Several studies had been reported on techniques for studying root development of crop plants. Most of these techniques have required either excavation and subsequent washing of roots, or the use of radioactive isotopes. These methods are tedious and laborious and entail employment of special equipment. Thus investigations on root growth and development have lagged behind those of the aerial parts.

The investigations reported here were undertaken to evaluate methods and investigate their reliability, precision, adaptability and simplicity for study of corn root development. The findings on seven techniques are summarized briefly in the following paragraphs:

The results from the "Differential Wetting of Soil" method suggested that regulation of moisture application to potted plants in the laboratory might be used in root development studies. Significant differences were obtained between weight of roots grown in wet soil and those grown in relatively dry soil.

The "Soil Zoning" method consisted of partitioning soil of different moisture contents by means of layers of paraffin containing 15 percent petroleum. The moisture zones were irrigated by means of a coiled copper tube with perforations along its length. The wax layer and the irrigation device, which previously were employed separately by different investigators, were combined in these studies. Results obtained suggested that this method could furnish reliable information on corn root development as influenced by moisture levels and by nitrogen fertilizers and possibly others.

The "Seedling Studies" method, in which corn seedlings were grown in seven-inch clay pots, appeared to be useful for evaluating root development in the early stages of growth. Significant differences were obtained among the hybrids used with respect to length of main roots, top growth and root/top ratios. Considerable care was required to prevent breakage of the tender roots during preparation for measurement.

Certain herbicides were placed in the soil at six-inch depth in cans. Corn seedlings were grown in these cans until toxic effects of the chemicals were observed in the top growth. Results obtained suggested that Dalapon and Du Pont TCA might be used to study elongation of corn roots if the time they actually touched the chemicals could precisely be estimated by the reaction of the aerial parts.

Four other toxic materials were placed at specific soil depths in cans with a capacity of 3.4 gallons. Three corn hybrids were grown in each of the cans. The data from this study suggested that potassium thiocyanate and ammonium thiocyanate could furnish information on root elongation of corn. Responses observed in the top growth of the hybrids indicated that the roots reached the chemicals at different times. It appeared that these chemicals might be used to take the place of radioactive isotopes.

In the "Soil Depth" method, corn seedlings were grown at specific depths and the time required for the roots to appear at the bottom of the cans was recorded. Results

indicated that this method could not be used for studies of corn root systems. There was no significant difference in the time required by the roots of different hybrids to show at the bottom of the cans.

In the "Glass Chamber" method, corn seedlings were grown in glass front cases which were graduated horizontally in half inches. Length measurement of the main roots of ten hybrids was taken twice daily throughout the experiment. Significant differences were obtained among the hybrids with respect to lengths of the main roots, root weights and root/top ratios. There was significant positive correlation from experiment to experiment. The results indicated that this method could be used to study root characteristics of corn plants in the seedling stage.

75 pages. \$2.00. Mic 57-2630

PHYSIOLOGICAL SPECIALIZATION IN THE
CUCURBIT ANTHRACNOSE FUNGUS
COLLETOTRICHUM LAGENARIUM

(Publication No. 21,903)

Monroe Jack Goode, Ph.D.
North Carolina State College, 1957

Supervisor: Don Edwin Ellis

Anthrachnose was observed and the causal fungus *C. lagenarium* was isolated from the resistant watermelon varieties Congo and Charleston Gray at 4 locations in Eastern North Carolina in 1954 and 1955. Single-spore isolates were made from various cucurbits including both anthracnose resistant and susceptible watermelon varieties, cucumber, cantaloupe, squash and pumpkin. The isolates were studied to determine whether physiological specialization existed in *C. lagenarium*.

An inoculation technique which gave repeatable results was developed. Using this technique, 3 physiological races were demonstrated in *C. lagenarium*. Race 1 attacked Butternut squash plants moderately, was severe on all cucumber varieties tested as well as on anthracnose susceptible varieties of watermelon. It caused slight injury to Charleston Gray, Congo and Fairfax watermelon seedlings; however, inoculated plants of these 3 resistant varieties recovered and continued to grow normally. Race 2 was moderately severe on Butternut squash and was highly pathogenic on all watermelon and cucumber varieties tested. Butternut squash was immune to race 3 which only rarely caused a superficial fleck-type reaction on leaves of the Congo, Charleston Gray and Fairfax watermelon seedlings. This race was highly pathogenic on all varieties of cucumber tested and all anthracnose susceptible watermelon varieties.

The 3 races were indistinguishable culturally or morphologically. Potential sources of resistance were found to all 3 races in both watermelon (*Citrullus*) and cucumber (*Cucumis sativus*). In the genus *Citrullus*, the commercial watermelon varieties Charleston Gray, Congo, Fairfax and Black Kleckley were resistant to race 1. All the watermelon varieties tested were susceptible to race 2 but 19 plant introductions showed some resistance. No symptoms have appeared on 1 plant of a watermelon line from South Africa (W-695). Ten citron seedlings were also resistant.

The commercial varieties Charleston Gray, Congo and Fairfax were highly resistant to race 3.

Race 1 was pathogenic to all cucumber varieties, but highly resistant individuals were found in the *C. sativus* plant introductions PI 197087 and 175111. Two breeding lines SC 50 A-8 and SC 50 E-4, which were obtained from Barnes, as well as 2 plant introductions PI 197087 and 175111 were resistant to race 2. Resistance to race 3 was found in PI 197087, 163213, 175111 and a breeding line from Barnes, SC 50 B-5.

The resistant plant introduction lines of *Citrullus* and *Cucumis* are usually not homozygous for resistance. Different sources of the same PI line differed greatly in their resistance to a given race of *C. lagenarium*.

86 pages. \$2.00. Mic 57-2631

VERTICILLIUM WILT OF POTATO IN RELATION TO SYMPTOMS, EPIDEMIOLOGY AND VARIABILITY OF THE PATHOGEN

(Publication No. 21,865)

Dean Boundy Robinson, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor R. H. Larson

Verticillium wilt of potato has become increasingly important in many potato growing areas of North America, and conflicting reports have appeared on the susceptibility of certain potato varieties and on the effect of environment on disease incidence. The purpose of the present studies was to extend knowledge on the epidemiology of the disease and to study the variability in isolates of the pathogen obtained from potato.

Cultural and pathogenicity comparisons of isolates were made under controlled conditions in the laboratory and greenhouse. Studies on epidemiology were carried out in field plots in Wisconsin and in Prince Edward Island.

Isolates of the fungus, collected from many widely scattered areas in the United States and Canada, were found to be of two distinct morphological types, identifiable by the formation of pseudo-sclerotia or dark, resting mycelium, respectively.

Dark mycelial isolates had lower temperature maxima for both growth and pathogenicity, and were generally more pathogenic on potato and tomato than were the pseudo-sclerotial forms. Mixed inocula could be separated, in vivo, into the two component types, by the use of suitable variety-temperature combinations. No change was noted in pathogenicity of monospore cultures of either type after several serial passages through host plants. Monospore analysis of an isolate of each type yielded forms common to both, but the bulk of the mononidial lines were distinctive and similar to the "wild" parent. Ultraviolet irradiation of a monospore culture of each type gave an array of morphological variants, but with no reversion of one type to the other. These variants were, in general, less pathogenic than the parent forms.

Surface contamination of tuber stocks with dark mycelial type isolates was shown to be important in wilt epidemiology. Surface cleansing of tubers of an infested stock, or fungicidal seed treatment, greatly reduced the severity of field wilt in crops grown from such stocks.

Resistant potato varieties were frequently found to be symptomless hosts of these Verticillia. The fungus was found to progress steadily throughout the plant during the growing season, and to continue its advance through tubers of a susceptible variety during winter storage.

An occasional stem streaking and a severe tuber lesioning were shown to be associated with Verticillium infection. Stem streaking was encountered only in the variety Irish Cobbler, and was found to be the result of extensive permeation of the plant by the fungus under conditions of high soil moisture and fertility. The extent of tuber lesioning, or brown eye, was correlated with the incidence of wilt and was very destructive in some varieties. Seed treatment gave good control of both disorders. Evidence was obtained that brown eye was incited by *Pseudomonas* bacteria.

The present study provides evidence in support of the view that isolates of Verticillium that form pseudo-sclerotia are *Verticillium dahliae* Kleb. and that those forming only dark mycelium are *Verticillium albo-atrum* R. and B. The regional differences in the distribution of these Verticillia, coupled with the findings on the epidemiology and symptomatology of the disease, point to the necessity of regional breeding programs for resistance and, in the case of susceptible varieties, to the need of seed treatment of planting stocks.

97 pages. \$2.00. Mic 57-2632

THE EFFECTS OF HIGH ANALYSIS SOLUBLE FERTILIZERS AS INTERRELATED WITH ENVIRONMENTAL CONDITIONS AND CULTURAL PRACTICES ON THE GROWTH AND YIELD OF VEGETABLES WITH SPECIAL REFERENCE TO THE TOMATO

(Publication No. 21,391)

Herman Tiessen, Ph.D.
Michigan State University, 1956

Transplants of various vegetable crops were grown under various environmental conditions and treated with different analyses and concentrations of soluble fertilizer. Records were taken of plant composition, growth, and yield.

Greenhouse and laboratory studies indicated that nitrogen absorption by tomato plants was influenced more by nitrogen application in the fertilizer solution than by soil temperature (46 to 70°F). Phosphorus absorption by tomato plants apparently occurred at low temperatures (54 to 62°F) only at high concentration in readily available form. A high soluble phosphorus content in tomato plants from starter solutions shortly after field setting was correlated with subsequent growth and yield. The fertilizer solutions also tended to decrease flower abscission of tomato plants and increase the fruit set and early yield. Starter solutions had little or no effect on tomato plant growth at the lower soil temperatures (46 to 54°F).

The crops tend to vary in their response to the fertilizer solutions. Tomato root development was benefitted particularly from phosphorus and nitrogen, whereas potassium was as important as nitrogen and phosphorus for tobacco root development. Earlier maturing tomato varieties, such as Valiant responded more to fertilizer

solutions than the later maturing varieties, such as John Baer. Stokesdale tomatoes produced higher yields when nitrogen was low, whereas Longred required a high nitrogen as well as a high phosphorus. This is probably the result of prevailing soil types in regions where they were developed. The cole crops and celery respond to starter solutions containing a high nitrogen and phosphorus (23-52-0).

The most important factor in high analysis soluble fertilizer solutions is their ability to supply immediately available nutrients in close proximity to plant roots at

the time of the plants most critical need, thereby increasing vegetable crop yields when applied to transplants on soils of medium to low fertility. Other uses are in fertilizing greenhouse crops with a reduction in the osmotic value of their soil solutions. Nutrient additions to seedling plants can be more easily manipulated by starter solutions than by dry fertilizers. The rate, analysis and time of application of the high analysis soluble fertilizer solutions vary with the crop, variety, plant maturity, soil type and fertility.

139 pages. \$2.00. Mic 57-2633

ANTHROPOLOGY

BURMESE RELIGION AND THE BURMESE RELIGIOUS REVIVAL

(Publication No. 20,831)

John Frank Brohm, Ph.D.
Cornell University, 1957

In the period following Burma's achievement of independence from Great Britain in 1948, there has arisen in that country what has been spoken of as a great Buddhist religious revival. This revival has enjoyed the enthusiastic support of the Burmese government, which, in denying responsibility for the overall sponsorship of the movement, maintains that it is merely assisting the development of a spontaneous national upsurge of religious sentiment. The questions which the thesis raises and seeks to answer, therefore, are whether or not there is any fundamental grass-roots basis for the revival, and if not whether the movement has any prospects for eventual success.

Contemporary Burmese culture, including Burmese religious behavior, is very imperfectly documented in ethnological literature. Buddhism is of course the professed religion of all Burmese. But knowledge of the ideal forms and content of an international canonical tradition like Buddhism, while essential for an understanding of the religious behavior of a literate people, will not of itself be descriptive of that behavior. The essay attempts, by means of a village study conducted by the writer in the Central Plain area of Burma in 1953, to describe the most significant aspects of Burmese religious behavior as they exist today among the peasant masses. In so doing, a broader picture of village life is also presented.

The apparent contrast between rural traditionalism in religious behavior on the one hand and urban transition and innovation on the other is noted in an ensuing examination of the modern historical development of the altered religious forms of cosmopolitan Burma, chiefly of Rangoon. The causes for a reoriented view of reality among urban Burmese are seen in the impact of Western acculturation, felt primarily by the city-dwellers through direct contact with their British colonial masters. "What had to emerge was a sophisticated Burmese Buddhism, devoid of the 'superstitious' trappings of the peasant religion, dynamic, 'scientific,' aware of Western knowledge and orientations and able to exploit the faults in those systems with superior logic."

If the urban religious response to acculturation may be legitimately viewed as a "revival," its sponsorship has been subscribed, to an increasingly important degree, by the independent post-war government of Burma. The various measures which the government has adopted since 1949 to further this program are outlined and analyzed, including the recently convened Sixth Buddhist Synod. The financial aspects of these ambitious undertakings are noted and public criticisms of the program among politically sophisticated Burmese are advanced to indicate the narrowness of the intra-governmental faction which has been responsible for what has been attempted.

It is concluded that one can legitimately speak of a religious revival in Burma, viewing it in the light of Linton's concept of a nativistic movement. But it is recognized that the revival has had and can have little in the way of true grass-roots support since it is the stimulus of culture-contact with the West, felt primarily by urban Burma, which has produced the intellectual and spiritual ferment shared by some of Burma's political leaders. The psychologically isolated and traditionalist peasant cannot share in the creation of what is essentially a new cultural ethos because his own reality system has not yet been sufficiently challenged by acculturative forces. To succeed in including the vast mass of the Burmese people in the regenerative upsurge felt by urban participants in the revival, it will be necessary to communicate effectively with the peasant, in both the mechanical sense and the psychological sense, and bring about his identification with the national elite. That this has not yet been done seems indicated by the village study upon which the thesis has been based.

519 pages. \$6.60. Mic 57-2634

**THE CULTURAL CONNECTIONS BETWEEN
THE PREHISTORIC INHABITANTS OF THE UPPER
MISSOURI AND COLUMBIA RIVER SYSTEMS**

(Publication No. 20,588)

Carling Isaac Malouf, Ph.D.
Columbia University, 1956

The Purpose of this study is to determine what relationships might have existed during prehistoric times between the ancient inhabitants of the Upper Columbia River Basin and the Northern Plains.

Considerable progress has been made in the study of the prehistory of the Northern Plains, particularly in North Dakota and South Dakota. Likewise, archaeologists in Washington and Oregon have contributed a large number of papers and reports on the prehistory of these two States. Much of the intervening area, however, has remained unstudied and unreported by field workers.

Original field work resulted in the collection of specimens and new data from two new regions covering much of Montana and Wyoming. These two newly recognized regions, plus two already known to archaeologists may be listed thus, from east to west: (1) The Northern Plains Region. (2) The Northwestern Plains Region. (3) The Montana Western Region. (4) The Middle Columbia Region. Through these regions flowed traits of culture, and occasionally there were actual migrations of people as well.

In the Plains there were three main epochs. These are distinguished on the basis of point forms and associated specimens, forming a complex. Ranging from the oldest to most recent these epochs are:

NORTHWESTERN PLAINS REGION	NORTHERN PLAINS REGION
I. <u>The Early Hunters</u>	I. <u>The Early Hunters</u>
a. Folsom complexes	a. Folsom complexes
b. Yuma complexes	b. Yuma complexes
II. <u>The Foragers</u>	II. <u>The Foragers</u>
III. <u>The Late Hunters</u>	III. <u>The Late Hunters</u>
a. Phase 1	IV. <u>The Horticulturists</u>
b. Phase 2	

In Washington and Oregon there were contemporaries of the Early Hunters of the Northern Plains, but they had an economy which placed a greater emphasis on gathering plants and small animals. The Montana Western Region seems to have been unoccupied at this time.

Artifacts and associated features which are characteristic of the Foragers can be found throughout the Plains. At least four different types of points were used at various times during this epoch, and associated with them are implements such as seed grinding stones. Root roasting pits also appear. Indians were now exploiting more of the plant and animal life for their livelihood. In the Montana Western Region the intermountain glacial lakes receded to a level where occupation of the valleys was possible, and earliest remains, particularly points, knives and scrapers are found on old lake terraces above modern Flathead Lake. The point forms and allied specimens show relationship to both those in the Northern Plains and in the Middle Columbia Region.

During the epoch of the Late Hunters in the Plains there was a shift from the hunting and gathering culture of the Foragers to an economy with a greater emphasis on the acquisition of buffalo. The earliest phase of this epoch

was common to both regions in the Plains. Later the economy was changed to the Northern Plains Region when horticulturists moved in from areas to the south, via the Missouri River. In the Northwestern Plains Region, however, hunting remained the primary occupation. Side-notched points almost universally had replaced the earlier corner-notched variety. The latter, however, were retained by the inhabitants of the Montana Western Region. Pipes, decorative pieces, stone circles, figurines, mauls, and other items appeared in the Plains in abundance, and some of these moved toward the west ultimately reaching the Columbia River Basin. After whites arrived in North America the movement was greatly accelerated, and much of it was through the Montana Western Region. Most of these elements, it should be remembered were items of material culture. At any rate, it was in the historic period that most of the things recognized as "Plains" among the inhabitants of the Columbia River Basin appeared in this part of the west. 328 pages. \$4.20. Mic 57-2635

INCA LAW AND GOVERNMENT

(Publication No. 21,808)

Sally Falk Moore, Ph.D.
Columbia University, 1957

Inca Peru has been variously described as a form of state socialism and as a feudal monarchy. With concrete legal material at hand it has been possible to describe quite specifically the conditions which make such varying interpretations possible, and to alter a number of the traditional assumptions about the Inca.

The conception of the decimal system of government administration as a single pyramidal hierarchy is demonstrably an ideal concept incompletely realized. The pyramid diagrammatically heals the significant breach between the Inca conquerors and the peoples they conquered. It tactfully ignores all the checking and spying and colonizing with potential soldiers (mitimaes) the victors used against vanquished.

Except possibly for judicial envoys of the central government sent to handle certain state crimes, and the possible existence of a court in Cuzco, there was no separate judiciary, and all judicial functions were handled by officials who conducted other affairs of government. This is seen in context when one considers that there were special officials for checking and accounting and dealing with the various aspects of the tribute system, many of whom also had punitive powers. There was no form of appeal though there was review. Judicial development appears to have been fairly rudimentary. This reflects significantly on one aspect of the conception of the Inca as a culture most highly developed in government skills.

The taxation system impresses one with the extent to which the empire was a tribute empire rather than an economically interdependent whole. The preoccupation with taxation rather than social planning or paternalism may well have been the foundation of many social achievements.

The elaborate taxation system is coupled with what appears to be the remarkable absence of any government-connected commercial law. This is generally attributed

to Inca monopoly. Yet, it can be shown that the limited and local nature of trade may have been a result more of the locally-centered community and economic structure than of any restrictive policies of the Inca government.

Detailed inspection of the legal rights and duties connected with land and land produce shows the inadequacy of the traditional view that land was held only by the Inca, the Sun and the Communities. The celebrated bureaucracy itself is shown by the land law to have been more like a landed ruling class than a salaried civil service.

There is no doubt that the Inca state had a highly developed tax system. In this respect the usual view of the integration of conquered territories into an empire does not seem to have been exaggerated, nor does the incorporation of local government into an administrative hierarchy.

However, inspection of Inca law obliges one to note the limited judicial development, local variations, the absence in the criminal law of common economic penalties, and the absence of commercial law and market taxes, as well as the existence of a complex of land rights other than the simple government-planned Inca, Sun and Community division. One is also struck by the pervasiveness of class differences in all aspects of the legal system, be it the type of landholding, taxation and taxability, or status before the criminal law. These all bind the Inca empire to its historical past and modify the master-plan conception of Inca politics and law. 270 pages. \$3.50. Mic 57-2636

ACCOKEEK: A MIDDLE ATLANTIC SEABOARD CULTURE SEQUENCE

(Publication No. 21,674)

Robert Lloyd Stephenson, Ph.D.
University of Michigan, 1956

The Accokeek Site, on the lower Potomac River in Maryland, is a large archeological site of extensive time depth. It was excavated between 1935 and 1940 by Alice L. Ferguson. Analysis of the remains from the site has provided evidence upon which a cultural sequence has been suggested. This cultural sequence provides the basis for a framework of cultural reconstruction and chronology for the area and upon which that area has been delimited and defined as the Middle Atlantic Seaboard Culture Province. This province has been shown to be a more or less stable entity throughout the entire time span of its occupation by the aborigines.

The cultural sequence which has been developed here consists of five Periods each of which encompasses one or more components or foci and is identified by a set of culture traits. Of these culture traits, ceramics has been the one upon which most of the weight of the reconstructions rest.

The earliest occupation represents an unnamed component of the Late Archaic Period. It is represented by stoneware vessels, grooved axes, bannerstones, celts, and large, stemmed projectile points made from non-quartzitic materials. Both pottery and agriculture are absent.

The second occupation represents a component of the Marcey Creek Focus of the Early Woodland Period. It is represented principally by pottery of the Marcey Creek Ware of which the type Marcey Creek Plain is a part. Non-ceramic materials are similar to those of the earlier component out of which it developed but agriculture was probably added to the culture complex.

The third occupation represents a component of the Pope's Creek Focus of the Early Woodland Period. It is represented principally by pottery of the Pope's Creek Ware of which the type Pope's Creek Net Impressed is a part. Non-ceramic materials are not distinctive but agriculture was probably a part of the complex. This component is not a development out of the earlier ones but was a new development in the area.

The fourth occupation represents a component of the Accokeek Focus of the Middle Woodland Period. It is represented principally by pottery of the Accokeek Ware of which the type Accokeek Cord Marked is a part. Non-ceramic materials include medium sized projectile points of quartzite, tobacco pipes, and probably agriculture. This component is a development out of the earlier Pope's Creek Focus.

The fifth occupation represents a component of the Mockley Focus of the Middle Woodland Period. It is represented principally by pottery of the Mockley Ware of which the types Mockley Cord Marked, Mockley Net Impressed, and Mockley Plain are a part. Non-ceramic materials are not distinctive but appear to be similar to those of the preceding component out of which it developed.

The sixth occupation represents a component of the Potomac Creek Focus of the Late Woodland Period. It is represented principally by pottery of the Potomac Creek Ware of which the types Potomac Creek Cord Impressed and Potomac Creek Plain are a part. A minor pottery is the Moyaone Ware. Non-ceramic materials include triangular and lozenge shaped projectile points, stockaded villages, large refuse pits, and ossuaries. Pottery tobacco pipes were used abundantly and agriculture was practiced. This component was not a development out of the earlier ones but was a new development in the area.

The historic occupations include the last quarter century of the Potomac Creek Focus occupation, and the influence of the Jamestown and Maryland colonies on the site in the seventeenth century. The Susquehannock occupation of the site in 1675 was the final Indian occupation. White occupations began with two eighteenth century houses on the site and continued through many colonial and American ownerships up to the present owner, Dr. Henry G. Ferguson. 474 pages. \$6.05. Mic 57-2637

BACTERIOLOGY

STUDIES ON THE LACTOBACILLI FROM THE ORAL CAVITY OF THE ALBINO RAT

(Publication No. 21,523)

Harold Vernon Jordan, Jr., Ph.D.
University of Maryland, 1957

Supervisors: Dr. John E. Faber, Jr., and
Dr. Robert J. Fitzgerald

Oral lactobacillus populations of white rats on cariogenic and noncariogenic diets were sampled by a special method of differential counting. Heterofermentative lactobacilli were differentiated from homofermentative lactobacilli by recognition of characteristic colony types in Rogosa's SL medium. Photographs of the different types are presented. Rats on diet 585, a coarse corn particle diet, developed severe dental caries in their molar teeth. This was accompanied by a progressive increase in the total numbers of lactobacilli. The percentage of heterofermentative lactobacilli increased to 50 per cent under these conditions. Addition of chloromycetin to diet 585 reduced the severity of dental caries and also reduced the total numbers of lactobacilli. However, the relative numbers of heterofermentative lactobacilli increased. Addition of aureomycin to diet 585 markedly inhibited dental caries and practically eliminated lactobacilli.

Rats on diet 550, a noncaries-producing diet, showed a lowered total lactobacillus count and the percentage of heterofermenters did not increase.

Coarse corn and fine corn diets of similar composition (diet 585) induced the same degree of caries in rats. Lactobacillus populations of rats on these two diets did not differ markedly. Possible significance of these findings has been discussed.

Lactobacilli isolated from the oral cavity of the rat were found to be species which have been previously described in the literature. Several varieties of *Lactobacillus fermenti*, *Lactobacillus acidophilus*, and *Lactobacillus plantarum* were recognized. Certain homogeneous well defined groups bore only a superficial resemblance to established species, nevertheless were not considered to be sufficiently different to warrant creation of new species. The fastidious nature of many homofermentative strains was demonstrated.

A pigmented variety of *L. fermenti* was described which is apparently indigenous to the rat. It produced a rusty-orange pigment under certain conditions of growth. This organism is otherwise identical to certain nonpigmented strains of *L. fermenti* from the rat. Certain cultural conditions are necessary for chromogenesis. Pantothenate was necessary for full growth and pigmentation. Partial growth without pigmentation was obtained in the absence of methionine and phenylalanine. Reducing conditions appeared to be necessary for pigment production.

Many homofermentative lactobacilli from rats would not grow in a defined medium. They exhibited a requirement for a growth factor present in an enzymatic digest of casein

(Casitone). This active material could be adsorbed on Darco G 60. Fractionation of Casitone on a chromatopile yielded an active fraction which contained a tripeptide composed of aspartic acid, alanine, and either leucine or tyrosine. Alanine appeared to occupy the C-terminal position.

Aspartic and glutamic acids and their amides and arginine were stimulatory in the presence of Casitone. Peptides of glutamic acid were shown to be more stimulatory than the free amino acid.

A partial hydrolyzate of protamine which was assumed to contain arginine peptides was stimulatory in the presence of Casitone and could initiate restricted growth in its absence. A strain of *L. acidophilus* isolated from a rat was utilized in the nutritional studies.

Mechanisms for peptide utilization and possible implications of the present work were discussed.

123 pages. \$2.00. Mic 57-2638

FACTORS INFLUENCING GROWTH INITIATION OF *BACILLUS GLOBIGII*

(Publication No. 21,036)

Tom Paul Sergeant, Ph.D.
The University of Texas, 1957

Supervisor: Dr. C. E. Lankford

The biological effects and chemical characteristics of a bacterial growth stimulant formed in autoclaved solutions of glucose and phosphates ("GP factor") have been investigated. The distinctive effect of the GP factor is a marked reduction in growth lag of *Bacillus* spp. inoculated into an otherwise adequate chemically defined medium. Although formed under the same conditions as a factor which stimulates growth initiation of lactic acid bacteria, the *Bacillus* GP factor is demonstrably different in certain of its chemical characteristics.

The GP factor stimulates growth of *Bacillus globigii* by reducing the duration of the initial stationary phase and growth lag of inoculum cells, although growth eventually occurs in its absence. The growth rate and maximum cell density are independent of the GP factor. The delayed growth which occurs in the absence of GP factor is not the result of selection of non-dependent mutant cells, but appears to involve some adaptive process. The ratio of the growth lag of cultures without GP factor to those with the factor is increased as the inoculum size is reduced, or as the concentration of GP factor is increased up to a maximum. If the addition of GP factor to a lagging culture is delayed, the lag is extended in proportion to the extent of the delay. There is some evidence that temporary exposure of cells to GP factor may condition the inoculum cells to subsequent initiation of growth in its absence.

The quantitative growth response of *B. globigii* to GP

factor was studied in a filtered glutamate- NH_4^+ -salts-glucose medium, to which biotin and diphosphopyridine nucleotide (or nicotinic acid) were added to decrease growth time. The pyridine compounds appear to cause initiation of cell division even more promptly than the GP factor alone, but in the absence of the latter the subsequent growth rate is slow and may decelerate and cease. In a medium containing the former, GP factor appears to function in maintaining the "normal" growth rate. Certain complex material of natural origin contain substances which in low concentrations may enhance the activity of GP factor, and which in high concentrations may substitute for it.

A procedure for activity assays has been developed, based upon the growth response (turbidity) to graded doses of the GP factor within a limited incubation period. With this assay it was found that GP factor is acidic and non-volatile, that it is extractable with ether and absorbable from glucose-phosphate solution with charcoal, from which it may be eluted with pyridine. Ether extracts with 300 fold potency and activity in the sub-microgram range have been obtained. Assays of residual activity in chemically-treated concentrates of GP factor indicate it to possess

unsaturated bonds, at least one carboxyl and one hydroxyl group, and that it is not phosphorylated.

A limited search for compounds of known structure capable of substituting for GP factor yielded two compounds of appreciable activity. Kojic acid, also known to stimulate growth of lactobacilli, was highly effective for *B. globigii*, while citric acid, alone of the Krebs cycle acids tested, was active in relatively high concentrations. These and certain other acids (e.g., ascorbic acid, glycolic acid, salicylic acid) since found to substitute for GP factor seem more likely to function as metal chelating agents than as metabolic substrates.

This function also was suggested by the observation that whereas *B. globigii* requires manganese for optimum growth, effective concentrations of its ionic form delayed growth initiation and were poorly assimilated in the absence of adequate GP factor. It is postulated that GP factor and other active substances function as specific metal carriers, or as "buffers," by providing the cell with a non-ironic, non-toxic controlled supply of assimilable metals essential to certain growth-limiting processes.

154 pages. \$2.05. Mic 57-2639

BIOLOGY — GENETICS

THE INHERITANCE OF BROWN SPOT RESISTANCE IN CORN

(Publication No. 21,900)

Robert Harry Moll, Ph.D.
North Carolina State College, 1957

Supervisor: Paul Henry Harvey

The purposes of this study were to gain knowledge about the inheritance of resistance to brown spot of corn and to examine the partitioning method of genetic analysis proposed by Powers, Locke and Garrett in 1950.

The partitioning method of genetic analysis was approached as two distinct procedures. These are (1) the partitioning method using the normal distribution and (2) the partitioning method using the observed distributions. The advantage of the method using the normal distribution is that it permits the testing of genetic models in which the value of each genotype may be specified. The difficulties which were encountered were: (1) no critical

test was found which would lead to a unique solution, (2) certain assumptions concerning the normality of the distributions and estimates of the mean and variance may not be valid for data obtained by use of a rating scale such as the one used in this study, (3) the procedures are cumbersome and time consuming which probably limits the method to characters involving few loci. The method using the observed distributions is at present limited to testing only three hypotheses; viz., that one, two or three loci are segregating for the character in question. The advantage of this procedure is that no assumptions are made about the form of the distributions, and estimates of the mean and variance are not required.

The results of this study indicate that at least four loci influence the resistance to brown spot in corn, and there is evidence that epistasis is involved. Hypothetical considerations based on the genetic models derived and supported by empirical results suggest rather strongly that the disease reaction of single crosses cannot be predicted from the disease reaction of the inbred lines.

93 pages. \$2.00. Mic 57-2640

BOTANY

A COMPARATIVE CYTOLOGICAL STUDY OF FOUR SPECIES OF CHLAMYDOMONAS

(Publication No. 22,007)

Neal D. Buffaloe, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Harold C. Bold

Four species of Chlamydomonas, C. eugametos Moewus, C. chlamydogama Bold, C. reinhardtii Dangeard and C. moewusii Gerloff, were studied cytologically and compared. Particular study was devoted to mitosis and meiosis. These processes proved to be essentially similar in all 4 species and to follow the classical patterns observed among plants. No dissimilarities were noted in mitosis as it occurs in these organisms and the pattern which has been described for other species of Chlamydomonas by earlier investigators. The haploid chromosome number was found to be 8 for all 4 species; this constitutes a much lower count than those reported by recent workers for C. eugametos, C. reinhardtii and C. moewusii. Drawings and photographs are presented which substantiate the conclusions regarding chromosome number. It was found that when vegetative cells of C. eugametos and C. moewusii are grown at a light intensity of 800 foot-candles, temporary polyploidy is exhibited by certain cells. Somatic reduction, the exact mechanism of which was not determined, eventually results independently of light. This pattern of behavior was not observed in C. chlamydogama and C. reinhardtii. Subjection of vegetative cells of C. eugametos to 0.2% colchicine incorporated into inorganic agar medium resulted in marked cytoplasmic and nuclear effects, most of which were initiated by 10-14 hours' exposure at 800 foot-candles of continuous illumination. Enlargement of cells occurred up to 78 hours' exposure, at which time the largest cells measured about 48 μ in diameter, as compared with the largest untreated cells which average 12 μ x 9 μ . Increase in cell size was accompanied by an increase in nuclear mass, many nuclei attaining a high degree of polyploidy. Transfer of enlarged cells with polyploid nuclei to colchicine-free media resulted in a process of recovery in a small percentage of the cells. Somatic reduction of such nuclei continued until all daughter cells eventually possessed haploid nuclei. No polyploid strains of C. eugametos were isolated.

123 pages. \$2.00. Mic 57-2641

MODE OF PATHOGENESIS OF THE GRANVILLE WILT BACTERIUM, PSEUDOMONAS SOLANACEARUM

(Publication No: 21,894)

Akhtar Husain, Ph.D.
North Carolina State College, 1957

Supervisor: Arthur Kelman

In an investigation of the mechanism of wilting and tissue breakdown by Pseudomonas solanacearum E.F. Smith, three strains were compared for their specific effects on host plants and production of injurious substances in culture. The highly pathogenic strain (F₁) caused rapid wilting and death of host plants, the weakly pathogenic strain (B₂) did not induce wilting, but caused yellowing and stunting, and the avirulent strain (B₁) produced no external symptoms of the disease.

A heat-stable viscous substance was obtained by alcoholic precipitation from the culture filtrate of F₁ strain. A similar substance was not present in the culture filtrate of B₁ and B₂. This heat-stable material caused reversible wilting of tomato cuttings. A heat-stable component of the tracheal fluid from diseased tomato and tobacco plants also induced partially reversible wilting in cuttings. The tracheal fluid of healthy plants caused no injury. Preliminary chemical analysis of the wilt-inducing substance from culture filtrate indicated that it was a complex polysaccharide. In smears stained by the eosin-serum method, a loose slime layer was present around cells of F₁ obtained from culture on solid media and exudates from diseased plants. Such a slime was absent around the cells of B₁ or B₂. The wilt-inducing substance present in the culture filtrates of the F₁ strain and the extracellular slime layer formed by this strain were considered to be the same material.

The culture filtrates of all the strains contained pectin-methylesterase, polygalacturonase and cellulase (Cx). Expressed juice of diseased tomato plants also contained these 3 enzymes, but juice from healthy plants did not.

Although culture filtrates of the B₁ and B₂ strains that did not form slime showed high pectic enzyme activity, these filtrates did not induce wilting in cuttings. A purified polygalacturonase also did not cause wilting of tomato cuttings although stems were macerated. Both heated and non-heated solutions of a crude pectic enzyme preparation (Pectinol-100 D) produced wilting and severe injury in cuttings, but only the latter caused maceration. Wilting of tomato cuttings was caused by a highly purified cellulase from Myrothecium verrucaria.

Microchemical tests on stem sections from diseased tomato and tobacco plants indicated that both the cellulose and pectic materials of the tissues were affected. Deposits of pectic materials in the vessels of infected plants were not observed. Similar breakdown of constituents of cell walls and middle lamellae was also noticed in cuttings

treated with bacteria-free culture filtrates and different purified enzymes.

It was concluded that slime formed by the highly pathogenic *F₁* strain plays a major role in the mechanism of wilting. The viscosity of the vascular stream is greatly increased by the slime and water movement is impeded and eventually blocked. Pectic and cellulolytic enzymes increase the severity of wilting by disorganization of vascular tissue. The weakly pathogenic and non-pathogenic strains of *P. solanacearum* have lost the ability to produce a slime layer. Limited multiplication of these strains in host plants may be related to the absence of a slime layer.

96 pages. \$2.00. Mic 57-2642

CARBON DIOXIDE FIXATION BY PLANT ROOTS AND ITS INFLUENCE ON CATION ABSORPTION

(Publication No. 21,895)

William Addison Jackson, Ph.D.
North Carolina State College, 1957

Supervisor: Nathaniel T. Coleman

Experiments using snap bean roots and various salt solutions were conducted to determine the relationship between organic acid production and cation absorption.

Maintenance of ambient solution pH above 7 resulted in the accumulation of organic acids in the roots, with malate accounting for the largest portion of the increase. Carbon dioxide fixation by carboxylation of phosphoenolpyruvate was the mechanism responsible for malate production. Small amounts of carbon dioxide were sufficient to saturate the system. In the presence of ammonium ion, carbon dioxide fixation was not reduced appreciably but aspartate or glutamate rather than malate accumulated.

Potassium and calcium absorption was associated with organic acid accumulation. Potassium absorption from bicarbonate solutions differed both in rate and magnitude from that in the absence of bicarbonate indicating two mechanisms for potassium accumulation.

Roots lost inorganic cations, organic acids and amino acids to external solutions. Loss of potassium and calcium was increased by low pH and by the presence of aluminum in the substrate. Loss of organic components was increased sharply below pH 4 although appreciable amounts were lost above pH 4. The amounts of organic acids lost were not related directly to their concentration in the tissue. Exudation of amino acids to external solutions was increased by the presence of KCl and was decreased by CaCl₂.

A substance which inhibited subsequent potassium absorption from KCl solutions also was secreted from bean roots. This material did not inhibit potassium absorption from KHCO₃.

172 pages. \$2.25. Mic 57-2643

A STUDY IN THE GENUS PEYRONELLAEA

(Publication No. 21,920)

George Miller Luedemann, Ph.D.
Syracuse University, 1957

Peyronellaea glomerata (Corda) Goid. ex Togliani [syn. *Phoma glomerata* (Corda) Wr. and Hoch.] was isolated during the autumns of 1954, 1955, and 1956 from an erineum found upon the petioles of the black walnut (*Juglans nigra* L.). Additional isolations of this species were made from various plant debris during the autumns of 1955 and 1956. The isolates of *P. glomerata* made in the present study indicate that it is an organism commonly encountered in the decay of senescent and dead plant parts and is particularly abundant during the autumn in this locality. Cultural and morphological studies are reported in conjunction with a review of the literature in an attempt to correlate the various species in this group. Based upon these studies an additional list of synonyms is proposed for *Peyronellaea glomerata* which include *Phoma conidiogena* Schnegg (Benham's isolate), *Phoma hominis* Agostini and Tredici, and *Phoma fumaginoides* Peyronel (Sibilia's isolate). A number of differential media are proposed for the cultural study of species in the genus relating to the characteristics which the various media induce the organisms to display.

Cultural and morphological characterization is given to an isolate made from the gall on the walnut petiole which is thought to be distinct enough for varietal or species consideration in the genus *Peyronellaea*.

The similarity and differences between the dictyothallospores of the genus *Peyronellaea* and the dictyoporespores of the genus *Alternaria* are discussed and contrasted.

143 pages. \$2.00. Mic 57-2644

REPRODUCTION AND GROWTH IN VARIOUS LILY SPECIES FOLLOWING X- AND GAMMA-IRRADIATION OF POLLEN AND X-IRRADIATION OF SEEDS

(Publication No. 21,534)

Phil B. Price, Ph.D.
University of Maryland, 1957

Supervisor: Dr. Robert D. Rappleye

Studies were conducted to determine the effects of non-irradiated or irradiated pollen on the generative nucleus division and pollen tube growth, also to evaluate dominant lethality in its application to plants and to show the relationship of dosage to type and number of seeds produced, capsule size and weight, cytological and morphological abnormalities in the *F₁* generation, seed germination and seedling growth. Twelve species, varieties or hybrids of the genus *Lilium* were utilized.

No aberrations were observed in the generative nucleus chromosomes in pollen tubes of non-irradiated *L. canadense* pollen, but X-irradiation of pollen from 500-4000r produced an increase in number of chromosomal fragments, rings and bridges as dosage was increased. Division of the generative nucleus was stopped in 99% of *L.*

regale pollen tubes by a dosage of 22,000r and pollen tube growth of *L. superbum* pollen was stopped between 200,000r and 205,000r.

Six seed types developed following pollination with non-irradiated, X- or gamma-irradiated pollen given 500-4000r; (1) typical, (2) twin embryoed, (3) triplet embryoed, (4) seeds with small embryos, (5) endosperm but no embryo, (6) chaff.

Trends among the four main seed types, (1), (4), (5) and (6) which developed in the capsules of *L. amabile*, *L. canadense*, *L. concolor*, *L. davidi*, *L. humboldti*, *L. longiflorum* hort. vars. Ace and Croft, *L. x Maxwellii*, *L. pumilum*, *L. regale*, *L. speciosum* var. *rubrum* and *L. superbum* were quite definite with increased X-ray dosage. Typical seeds decreased and chaff increased in number with increased dosage. Seeds with small embryos exhibited a positive correlation to 1000r and negative beyond for some pollination groups and negative from control to 4000r in the remainder while "seeds" possessing an endosperm but no embryo showed an inconsistent pattern in relationship to dosage. Data taken on *L. pumilum* capsules showed that X-irradiation of the pollen indirectly affected capsule size and weight for capsule volume was over five times and capsule weight over four times as great with the controls as with those at the 4000r level.

Trends among the four main seed types developed in capsules of *L. x Maxwellii*, *L. speciosum* var. *rubrum* and *L. superbum* in the gamma-irradiation series were similar to those in the X-irradiation series. General observations revealed that gamma-irradiated pollen had the same secondary effect on capsule size and weight.

Dominant lethality, defined as "those factors which prevent, under normal environmental conditions, the development of the zygote in which they first occur" is not well adapted to studies in *Lilium* for it ignores the endosperm which develops as a separate tissue.

A total of 102 twin embryoed seeds developed in ten of the twelve lilies in the X-irradiation series while 15 twin were produced in the three lilies of the gamma-irradiation series. The highest frequency was at 1500r in both series. Over 75% of the twin embryoed seeds contained unattached embryos and the remainder were conjoined.

Fifty-four F_1 plants of *L. longiflorum* have flowered to date. Acentric fragments, acentric fragments and bridges, or rings were observed during meiosis in all 17 plants derived from seeds with small embryos while aberrations were noted during meiosis in only two of the 37 plants derived from typical seeds.

The lethal level for X-irradiated *L. davidi* seeds was established at slightly over 250,000r. Seeds given 5000r, 10,000r and 15,000r developed first true leaves at a higher rate than control suggesting that irradiation provides at least a transitory stimulation to growth.

Using number of typical seeds produced following pollination with pollen given 4000r as the criterion for classification, the lilies employed exhibited some variation in sensitivity to irradiation. *L. humboldti*, *L. x Maxwellii*, *L. regale*, and *L. speciosum* var. *rubrum* were least sensitive. *L. amabile*, *L. canadense*, *L. concolor*, *L. davidi*, *L. longiflorum* hort. vars. Ace and Croft and *L. superbum* somewhat more sensitive and *L. pumilum* most sensitive.

Differences obtained from the utilization of X- and gamma-irradiated pollen are probably due to differences in wave-length of the two radiation sources, slight errors in dosage measurement and treatment of unequal quantities of pollen.

124 pages. \$2.00. Mic 57-2645

A TAXONOMIC STUDY OF TREMELLA IN NORTH AMERICA

(Publication No. 21,994)

Richard Kirk Speairs, Jr., Ph.D.
Louisiana State University, 1957

Supervisor: Professor Bernard Lowy

This work is a taxonomic study of the genus *Tremella* in North America. Examinations of over three hundred and fifty specimens from four mycological herbaria, and a review of the literature have shown nineteen valid species of *Tremella* to be present. A key has been prepared for these species. The synonyms, description, type locality, habitat, distribution, illustrations, and specimens examined of each of these species are given.

Variations within the species, *T. lutescens* and *T. mesenterica* were found to be of such magnitude that often intergradation of so-called distinguishing characteristics occurred. Absence of any adequate single differentiating characteristic was noted. Original descriptions and subsequent collections and descriptions of *T. fimbriata*, *T. foliacea*, and *T. frondosa* were reviewed noting emphasis placed on substrate, color, and minor morphological differences, none of which were constant and peculiar to a particular species. It is concluded here that *Tremella mesenterica* is synonymous with *T. lutescens*, and that *T. foliacea* and *T. frondosa* are synonyms which should be cited as *T. fimbriata* Fries.

Stratification of the various species was studied and found to be of limited use. The status of fifty-seven species names of fungi recorded in the literature in North America as *Tremella* was determined. Fifty-four such names are assignable as synonyms to other genera, one name is a species *rejiciendum*, another a *nomen nudum*, while a third is a species *inquirendum*.

Ten of the nineteen species of *Tremella* indigenous to North America have been found in Louisiana. One or more of the nineteen species have been found in thirty-four states of the United States.

93 pages \$2.00. Mic 57-2646

A COMPARATIVE STUDY OF SEXUAL REPRODUCTION IN FOUR SPECIES OF *Chlamydomonas*

(Publication No. 22,026)

Francis R. Trainor, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Harold C. Bold

Results of comparative experiments on some factors affecting sexual reproduction in 4 species of *Chlamydomonas*, namely, *C. moewusii* Gerloff, *C. eugametos* Moewus, *C. reinhardtii* Dangeard and *C. chlamydogama* Bold, are reported. Experiments on growth demonstrated that all 4 organisms grew well on Medium I of Sager and Granick (1954), provided that vitamin B₁₂ was added for *C. chlamydogama*. Continuous illumination of 600-800 f.c. intensity at 20-22°C. was used for growth. Depletion of

nitrogen was found to be necessary for a sexual reaction in *C. chlamydogama*. The same was confirmed for *C. reinhardtii* and *C. eugametos*. *C. moewusii* reacted sexually, equally well, both with and without nitrogen starvation. Concentrations of 0.011%, 0.01% and 0.008% ammonium nitrate in Medium I were found to be the thresholds of nitrogen for a sexual reaction in *C. eugametos*, *C. reinhardtii* and *C. chlamydogama*, respectively. Optimal level of nitrogen for a sexual reaction in the same 3 species was found to be approximately 0.003%. Level of vitamin B₁₂ had no effect on sexuality in *C. chlamydogama*. Attempts to compound a harvesting solution based on results concerning inhibition of sexuality by inorganic salts other than ammonium nitrate met with little success.

Three-day-old cultures were shown to be adequate for optimal sexual reactions in all species under 12-hour and continuous illumination with the one exception that 9-day-old cultures were optimum for *C. eugametos* when mated under continuous illumination. Degree of dilution of gametes within a rather wide range was shown to have no effect on percentage of zygospore yield in the 4 organisms.

Illumination was found to be necessary for a sexual reaction in all species under the standard conditions of experimentation. Twelve-hour diurnal periodicity of illumination was optimum for *C. eugametos* and *C. chlamydogama*, as compared with continuous illumination for *C. moewusii* and *C. reinhardtii*. An intensity of illumination of 400-800 f.c. was optimum. Cumulative illumination of 24, 32, 36 and 16 hours was adequate for maximum zygospore production in *C. moewusii*, *C. eugametos*, *C. reinhardtii* and *C. chlamydogama*, respectively, under 12-hour diurnal illumination. Different light requirements were found under continuous illumination, namely, 26, 48, 10 and 22 hours, respectively. Evidence for inhibition of clumping by light and/or formation of pairs from clumps in *C. chlamydogama* has been presented. The relationship of the reaction with extracellular gamones in the filtrate of cells has been discussed. The course of the mating reaction has been described in detail on the basis of comparative experiments conducted under both continuous and 12-hour diurnal illumination. Each organism displayed differences in timing and differences in the sexual phenomena.

Data have been presented in summary form for obtaining clumps, pairs, plasmogamy and zygotes in the 4 organisms under investigation, along with information concerning which organisms are best suited for study of the various phases of the sexual process. Evidence has been compiled in tabular form to emphasize the numerous differences noted among the 4 organisms in the various reactions studied comparatively in this investigation. Exact duplication of every variable in an experiment is essential before comparison can be made with other investigations on *Chlamydomonas* species. Many inconsistencies in the literature appear to be a result of failure to duplicate experimental conditions of other investigators exactly.

137 pages. \$2.00. Mic 57-2647

CULTURAL AND CYTOLOGICAL STUDIES ON SPECIES OF LABYRINTHULA

(Publication No. 21,868)

Stanley Willard Watson, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Kenneth B. Raper

The genus *Labyrinthula*, created by Cienkowski almost a century ago, is generally regarded as allied with but differing from the slime molds. The few and incomplete reports of this genus in the literature contain many uncertainties regarding its morphology, gliding motility, taxonomy and its probable role as a parasite of marine plants. Lack of definitive reports is believed to result in large measure from the fact that earlier investigators observed only one or two strains for only brief periods in any one study, and always in non-reproducible crude enrichment cultures.

The aim of this investigation was to clarify some of the uncertainties regarding the members of this genus by studying simultaneously five morphologically different types grown in pure reproducible laboratory cultures. Certain of these were ubiquitously associated with a wide variety of marine plants on either the Atlantic or Pacific Coasts of the United States; while others were recovered only from a single locality. The ability of some of these isolates to function as extracellular parasites of the diatom *Nitzschia putrida* was demonstrated.

Similarities and differences of the five forms grown in laboratory cultures were compared to six species of *Labyrinthula* described by earlier workers on the basis of their (1) colonial organization, (2) cell size and shape, (3) movement, (4) type of cell division and (5) life cycle.

One of the strains studied by the author resembled Cienkowski's description of *Labyrinthula vitellina*, but differed from this sufficiently to warrant the creation of a new variety, designated *L. vitellina* var. *pacifica*. This new variety is distinguished by a different rate of motility, and by the production of flagellated cells from sporangia contained within its sorus. Still another of the author's isolates was easily delineated from all previously reported species by its size, shape and movement of cells; its method of division; its colonial morphology and its consistent production in aged cultures of multinucleate bodies resembling miniature plasmodia. The name *Labyrinthula minuta* was proposed for this organism because of its diminutive proportions.

Additional information concerning the life cycles of the other organisms studied by the author is required prior to designating them as new species, even though they differ apparently from species previously described by other investigators. Whereas observed similarities do not at present provide a sufficient basis for postulating phylogenetic relationships to the Phycomycetes, certain of these unnamed strains were of special interest since they showed at least superficial similarities to this class of true fungi. Further investigations may make it possible to categorize the genus *Labyrinthula* with some existing taxonomic group in the Phycomycetes or the Myxomycophyta.

177 pages. \$2.35. Mic 57-2648

CHEMISTRY

CHEMISTRY, BIOLOGICAL

METABOLIC PRODUCTS OF L-ASCORBIC ACID

(Publication No. 21,777)

Phillip Chonglin Chan, Ph.D.
Columbia University, 1957

Previous studies using ascorbic acid-1- C^{14} in the guinea pig and the rat have shown that 15-40% of the injected activity was respired as $C^{14}O_2$ in 24 hours, and 2-3% was excreted as urinary oxalic acid. When either uniformly labeled ascorbic acid or ascorbic acid-2,3,4,5,6- C^{14} was used, the percentage of $C^{14}O_2$ production was about the same, indicating that the carbon chain of this vitamin was extensively degraded in the animal body. Moreover, injection of ascorbic acid-2,3,4,5,6- C^{14} resulted in a 0.5% conversion to liver glycogen in the guinea pig in six hours. Glucose, derived from the isolated glycogen, was found to be uniformly labeled.

This work was designed to initiate experiments in guinea pig tissue preparations with emphasis on the isolation of radioactive intermediates in the metabolism of ascorbic acid. Experiments were carried out in guinea pig liver slices, liver homogenates and its fractions. In these systems it was found that oxalic acid was a non-enzymatic breakdown product of ascorbic acid. The results of experiments using chemically prepared dehydroascorbic acid, or dehydroascorbic acid generated in the reaction mixture by use of either a mitochondriacytochrome-c system or ascorbic acid oxidase indicate that the decarboxylation reaction requires the prior oxidation of ascorbic acid to dehydroascorbic acid.

Decarboxylation of dehydroascorbic acid was found to occur mainly in the supernatant fraction of the liver homogenate, and a five-carbon product, L-xylose, was isolated from the reaction mixture. The formation of L-xylose was increased about 6-fold when the system was fortified with DPN. The results suggest that a pathway of ascorbic acid metabolism involving L-xylose and L-xylulose as intermediates exists. The L-ketopentose can be converted to D-xylulose by enzyme systems reported recently. D-xylulose in turn can be converted to glucose through the pentose cycle.

40 pages. \$2.00. Mic 57-2649

SPECTROPHOTOMETRIC STUDIES ON THE ASCORBIC ACID-ASCORBIC ACID OXIDASE REACTION

(Publication No. 21,778)

Gerald Cohen, Ph.D.
Columbia University, 1955

Ascorbic acid oxidase is a copper containing enzyme which catalyzes the aerobic oxidation of L-ascorbic acid.

In this present investigation, the ascorbic acid oxidase-oxygen-L-ascorbic acid system was investigated via spectrophotometric means.

The enzymatically catalyzed aerobic oxidation of L-ascorbic acid is characterized by a loss of the $2650A^\circ$ band of ascorbic acid; the oxidation products showing no visible or ultra-violet absorption. This feature of the reaction has been utilized as the basis for a spectrophotometric method of determining enzyme activity. Under the conditions of the spectrophotometric activity measurement, the rate of loss of the $2650A^\circ$ band of ascorbic acid is directly dependent on the enzyme concentration and is essentially independent of substrate concentration. The concentration of enzyme may therefore be expressed in terms of the rate of loss of the $2650A^\circ$ band of L-ascorbic acid.

Several notable features of the spectrophotometric activity measurement are as follows:

1. The method is more rapid, more precise, and less cumbersome than the manometric technique of measuring the oxygen uptake during the enzymatically catalyzed aerobic oxidation of the substrate.
2. A lesser degree of inactivation is exhibited by the enzyme as compared to that observed under manometric operating conditions.
3. The method determines the activity of lower concentrations of enzyme than does the manometric method and may therefore be more useful for measuring the low ascorbic acid oxidase activity in natural sources.
4. The metallic ion catalysis of the aerobic oxidation of the substrate and the inhibition of ascorbic acid oxidase activity by extraneous cupric ion are conveniently eliminated from activity determinations by the use of ethylene diamine tetraacetic acid which complexes with metallic ions in solution but is incapable of complexing with the enzyme copper.

Several physical constants of the ascorbic acid oxidase-oxygen-L-ascorbic acid reaction have been evaluated from kinetic determinations employing the spectrophotometric method of enzyme assay. These are: the Michaelis-Menton constant ($2.38 + 0.33 \times 10^{-4}$ moles per liter at $25^\circ C.$); the specific reaction rate constant for the breakdown of the enzyme-substrate complex ($1.09 + 0.21 \times 10^4$ per second at $25^\circ C.$); and the turnover number of the enzyme extrapolated to optimum operating conditions (6.5×10^5 moles of L-ascorbic acid oxidized per minute per mole of enzyme).

Evidence is presented that the oxidation product of L-ascorbic acid which shows no absorption in the ultra-violet or visible regions is L-dehydroascorbic acid dihydrate. This hydrated diketone is then converted non-enzymatically and over a 24-48 hour period into an oxygen labile acid which shows a peak in the ultra-violet at $2890A^\circ$. This acid is most probably 2:3 diketo-L-gulonic acid, or one of its keto-monohydrates. Two other substances which are derived from L-dehydroascorbic acid dihydrate can also be spectrophotometrically detected. One of these has a peak absorption of $3400A^\circ$ and is a degradative product of

the substance absorbing at 2890\AA . The other is apparently L-ascorbic acid since it has a peak absorption at 2650\AA , the same position as L-ascorbic acid, and can be oxidized by the addition of enzyme.

A new method for the preparation of L-dehydroascorbic acid from L-ascorbic acid has been presented. It is based on the dehydrogenation of L-ascorbic acid by p-quinone, in anhydrous acetone. The crystalline product so obtained in 65-70% yield has been characterized by infra-red spectrum.

Finally, the possibility that the enzymatic oxidation of L-ascorbic acid may involve the hydroxylation of the enediol double bond to form L-dehydroascorbic acid dihydrate directly has been considered.

120 pages. \$2.00. Mic 57-2650

A STUDY OF THE CHEMICAL, PHYSICAL, AND KINETIC PROPERTIES OF INTESTINAL LIPASE

(Publication No. 22,011)

Renald Robert DiNella, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor H. C. Meng

Some of the chemical, physical, and kinetic properties of intestinal lipase were investigated using cell-free homogenates of hog duodenal mucosa. Lipolytic activity was determined spectrophotometrically by the decrease in optical density and/or chemically by the estimation of unesterified fatty acids of emulsified olive oil. Localized principally in the mitochondria and microsomes, intestinal lipase was extracted with alkaline buffer or serum. Serum albumin but not egg albumin, proteoses, nor water could replace serum as an extractant.

Of several natural lipids tested, only glycerides were hydrolyzed by intestinal lipase. The particulate and soluble mucosal fractions exhibited greater activity toward short chain fatty acid esters. However, this finding could have resulted from contamination with esterase. Intestinal lipase hydrolyzed equivalent concentrations of 1-mono-, 1:3-di-, and triolein at identical rates. Pancreatic lipase, however, was inactive toward 1-monoolein and hydrolyzed diolein at one-half the rate of triolein.

The optimal pH for intestinal lipase activity was 9-10. The temperature coefficient between $8-18^\circ$ was 2.0 (activation energy = 11,200 calories) diminishing to 0.2 between $38-48^\circ$. Intestinal lipase lost no activity after 24 hours at 37° ; 5 minutes at 65° produced total inactivation. The Km for the hydrolysis of olive oil emulsion was 3.0×10^{-4} M.

The ability of intestinal lipase to synthesize glycerides was studied. Incubating fatty acids and glycerol with intestinal lipase produced no net synthesis. Fatty acids were converted to their acyl-CoA derivatives with ATP and guinea pig liver. Addition of monoglycerides and cell-free duodenal homogenates produced a net synthesis of glyceride ester bonds, but it was not possible to repeat this result.

Calcium ions and bile salts stimulated the activity of intestinal lipase. The enzyme was strongly inhibited by 2×10^{-3} M para-chloromercuribenzoate (reversible with 4×10^{-3} M cysteine), serum albumin, quinine, and 10^{-5} M

diethyl-p-nitrophenyl phosphate. Fatty acids, heparin, Mn^{++} , Mg^{++} , and Cu^{++} produced slight inhibition.

The following had no effect on intestinal lipase: eserine, atoxyl, protamine, cyanide, diethyl-p-nitrophenyl phosphate (concentrations below 10^{-5} M), arsenate, iodide, chloride, and fluoride.

Intestinal lipase was differentiated from pancreatic lipase as follows: (a) Serum albumin inhibited intestinal lipase and stimulated pancreatic lipase. (b) Taurocholate and glycocholate stimulated intestinal lipase and inhibited pancreatic lipase. (c) Intestinal lipase was unaffected by pancreatic lipase inhibitors acetonitrile and benzaldehyde. (d) Using ethylenediaminetetracetic acid and dialysis, pancreatic lipase but not intestinal lipase exhibited a metallic cofactor requirement. (e) Both lipases displayed different hydrolytic patterns toward mono-, di-, and triglycerides.

No evidence was obtained to support the view of Anfinsen et al. (Science 115,583 1952) that incubating "tissue factor" with serum and heparin produces lipemia clearing factor. The present data indicates that "tissue factor" is tissue lipase and requires neither serum nor heparin to clear fat.

Tissues other than duodenal mucosa were assayed for lipase. In the dog, heart, lung, and mucosae of stomach, jejunum, and ileum contained lipase; activity was negligible in liver, thyroid, brain, skin, kidney, testes, spleen, large intestine, skeletal muscle, and diaphragm. Significant activity was found in intestinal and gastric mucosae, heart, and lung of rat and hog, and in heart and lung of rabbit. The clearing of fat by duodenal mucosa appeared to involve two components, (a) a substrate activator, (b) a lipolytic component (i.e., intestinal lipase).

A procedure was developed for the purification of intestinal lipase from hog duodenal mucosa. Specific activity was increased from 4.0 to 204, with a yield of 6%. The final product was essentially free from contamination with mucin.

168 pages. \$2.20. Mic 57-2651

RADIOACTIVE PHOSPHORUS STUDIES ON RESTING AND CONTRACTING MAMMALIAN MUSCLE

(Publication No. 21,953)

Glen Jackson Dixon, Ph.D.
University of Arkansas, 1957

Major Professor: Jacob Sacks

The literature has been reviewed from the time of Liebig and Berzelius to the present time. Special emphasis has been placed on the work of Embden, Meyerhof, Szent-Györgyi, and Sacks. Lohmann's work pertaining to the creatine kinase reaction has also been included. The more recent work of Mommaerts and Fleckenstein, et al has been mentioned in the historical review, but has been discussed in a later section in its relation to the present work.

The various procedures and methods employed have been described. The earlier work attempted a separation of the organic phosphorus compounds of muscle, which are extractable in trichloroacetic acid (TCA), by fractionation with barium hydroxide into barium-soluble and

barium-insoluble parts, followed by ion-exchange chromatography of the separate fractions. When this method was found to result in decomposition of some compounds, the TCA extract was submitted to ion-exchange separation directly, after removal of the TCA by ether in a continuous extractor.

The phosphorus containing compounds obtained by the ion-exchange separation procedure were: inorganic orthophosphate (IP), inorganic pyrophosphate (IPP), phosphocreatine (PC), adenylic acid (AMP), adenosine diphosphate (ADP), adenosine triphosphate (ATP), glucose-1-phosphate (G-1-P), glucose-6-phosphate (G-6-P), fructose-1-phosphate (F-1-P), fructose-6-phosphate (F-6-P). The amounts of these compounds are determined either by optical density measurements at 260 and 280 m μ , or by determination of phosphorus after it has been suitably removed from the compound.

The tables of data contain the quantities of compounds given as μ m of compound per gram of muscle and the specific activity of the phosphorus contained therein. Data are given for both resting muscle and muscle which had been subjected to 30 seconds anaerobic tetanus.

The findings of the present work have been discussed in relation to their bearings on, (1) the Embden-Meyerhof cycle of phosphorylating glycolysis, (2) the hypothesis of A. Szent-Györgyi which attempts to explain the mechanism of anerobic muscular contraction, (3) the creatine kinase reaction of Lohmann and (4) the adenylate kinase reaction of Colowick and Kalckar.

The present findings indicate that very little lactic acid is produced via the Embden-Meyerhof cycle during anaerobic muscular contraction. Data obtained on the hexose monophosphates and ATP indicate little contribution in either resting or contracting muscle from the cycle.

Specific activity data for the P groups of ATP and PC do not support the hypothesis of Szent-Györgyi, but rather support the findings of Fleckenstein, et al, and Mommaerts that ATP is not broken down during anaerobic muscular contraction.

The adenylate kinase reaction is believed not to be active in muscles on intact animals, as evidenced by specific activity data from the individual P groups of ADP and ATP. On the basis of specific activity data of the individual P groups of ATP and P group of PC the creatine kinase reaction is active to a very small extent, if at all, in resting and contracting muscle.

The present findings also indicate that AMP is present in very small quantities, if at all, in resting or contracting mammalian muscle. In the barium fractionation scheme, a considerable quantity of the ATP was shown to be hydrolyzed to AMP and IPP even at cold room temperatures.

Observations concerning the hexoses and hexose phosphates of resting and contracting muscle indicate a more complex situation exists than has previously been reported. Indications are that hexose is present as a complex polysaccharide not identical with glycogen.

In general, the findings support much of the earlier work of Sacks, which deal with muscle metabolism.

83 pages. \$2.00. Mic 57-2652

I: THE EFFECT OF TRACE MINERALS
DICALCIUM PHOSPHATE AND PHENOTHIAZINE
ON THE RESISTANCE OF GRAZING LAMBS TO
HAEMONCHUS CONTORTUS INFECTION
II: STUDIES OF THE EFFECTS OF CERTAIN
STRESS FACTORS ON THE RESISTANCE OF
LAMBS TO HAEMONCHUS CONTORTUS INFECTION

(Publication No. 21,851)

Royce Jasper Emerick, Ph.D.
The University of Wisconsin, 1957

Supervisors: Professors Paul H. Phillips and
Arthur L. Pope

Experiments were conducted over a period of four years (1953-1956) to obtain data on the effect of minerals and/or phenothiazine on the resistance of grazing lambs to Haemonchus contortus infection. In each of the four experiments 6 lots of 10 to 12 lambs each were infected with stomach worms by oral administration of 20,000 third stage Haemonchus contortus larvae per lamb. Various mineral and phenothiazine combinations were fed free choice. In one experiment additional phenothiazine was administered as a drench.

Death losses, fecal egg counts, hemoglobin values, and weight gains were the principal criteria used in measuring the response of the parasitized lambs to the various treatments.

In the experiment conducted during 1953 the feeding of trace mineralized salt resulted in a death loss which was 4 times greater than was obtained by the feeding of iodized salt. These deaths were accompanied by high fecal egg counts and low hemoglobin values. The feeding of dicalcium phosphate and/or phenothiazine prevented the detrimental effects attributed to the feeding of trace mineralized salt. Due to the adverse effect of feeding trace mineralized salt, however, none of the supplements in which it was employed proved to be superior to phenothiazine fed in combination with iodized salt.

Data obtained from the experiment conducted in 1954 indicated that trace mineralized salt was superior to iodized salt in preventing death losses. In addition, the feeding of this compound resulted in lower fecal egg counts and higher hemoglobin values. These results, although in conflict with those obtained in 1953, are in agreement with results previously obtained at this station. By most criteria, dicalcium phosphate and/or phenothiazine, when fed with trace mineralized salt, provided the lambs with additional protection against stomach worms. Dicalcium phosphate, however, proved to be of no value to the parasitized lambs when fed in combination with iodized salt.

In the experiment conducted during 1955, no deaths occurred from the stomach worm infection. Significant increases in weight gains, as well as lower fecal egg counts and higher hemoglobin values, resulted from the use of all combinations of dicalcium phosphate and phenothiazine. A slightly higher degree of resistance was obtained, however, when these lambs were also drenched with phenothiazine. No significant differences were observed in data collected on plasma inorganic phosphorus, plasma alkaline phosphatase and bone ash.

During 1956 an attempt was made to determine which component of dicalcium phosphate (calcium vs. phosphorus) was responsible for its protective effect. The infection

obtained during this experiment proved to be too mild to allow definite conclusions. By most criteria, however, calcium in the form of calcium carbonate tended to provide a greater degree of protection than did phosphorus in the form of monosodium phosphate.

The average data obtained from the four experimental periods indicate that dicalcium phosphate and phenothiazine, when fed with trace mineralized salt, were similarly effective in protecting lambs against stomach worms. These two supplements were most effective, however, when fed together in the same ration.

Studies were also made on the effects of certain stress factors on the resistance of lambs to *Haemonchus contortus* infection. During the course of these studies, it was shown that either a previous stomach worm infection or phlebotomy permitted lambs to exhibit a higher degree of resistance to the effects of a subsequent stomach worm infection. This increased resistance was characterized by lower death losses, lower average fecal egg counts and the production of higher grading carcasses. When metabolic stress was imposed upon lambs by feeding varying levels of iodinated casein, no degree of resistance to a subsequent stomach worm infection was noted. Thus it appears that stress involving factors other than activation of the hemopoietic system does not influence the response of sheep to a subsequent stomach worm infection.

124 pages. \$2.00. Mic 57-2653

SIALIC ACID CONTAINING COMPOUNDS, THEIR DEGRADATION, AND THE STRUCTURE OF SIALIC ACID

(Publication No. 21,792)

Ralph Heimer, Ph.D.
Columbia University, 1957

A mucoid was prepared from bovine submaxillary glands. It appeared homogeneous upon ultracentrifugation and electrophoresis. The mucoid contained fifty per cent carbohydrate, which was mainly N-acetylgalactosamine and sialic acid. The molar ratio of hexosamine to sialic acid was unity. The amino acids of the mucoid were determined by two dimensional paper chromatography.

A crystalline compound, $C_{12}H_{21}NO_6$, was obtained from this mucoid after hydrolysis by either weak acid or by enzymatic hydrolysis with preparations from *Vibrio cholerae* and pneumococcus (Type II). The crystalline compound gave the reactions of sialic acid, but contained a methoxyl group. On ionophoresis in 0.1 M acetic acid it migrated to the cathode, whereas authentic sialic acid moved to the anode. On paper chromatography in butanol, acetic acid and water two spots were observed (R_f .48 and .58). The R_f of sialic acid was .23 and .13. The crystalline compound could be converted to sialic acid by hydrolysis at room temperature. Sialic acid crystallized as compound $C_{12}H_{21}NO_6$ from anhydrous methanol. The crystalline compound was methyl sialate.

When methyl sialate was incubated for 48 hours with filtrates of *Vibrio cholerae*, 30 per cent of methyl sialate were destroyed. Boiled filtrates of *Vibrio cholerae* did not destroy sialic acid. Every mole of sialic acid destroyed gave rise to a mole of hexosamine as measured by the

Elson-Morgan reaction. On paper chromatography one of the degradation products moved like N-acetylglucosamine. Acid hydrolysis converted the degradation product to a material having the same R_f as D-glucosamine. This material upon oxidation with ninhydrin gave rise to arabinose. On absorption spectroscopy the Elson-Morgan chromogen of the degradation product and D-glucosamine were identical. The other degradation product gave the 2,4-dinitrophenylhydrazine test, having the same absorption spectrum as the hydrazone of pyruvic acid. A stoichiometric relationship between sialic acid and its degradation products, N-acetylglucosamine and pyruvic acid was established.

The proposed structure of sialic acid is N-acetyl, 2-keto, 3-deoxy, 5 amino, 5-deoxy, (2,6-pyranosido), glucononic acid. This structure also accounts for the behavior of sialic acid with semicarbazide, periodate, weak alkali, and p-dimethylaminobenzaldehyde. Alternative structures, proposed by other investigators are discussed. The mechanism of the newly discovered sialic acid splitting enzyme is discussed.

The mucoid of bovine submaxillary gland upon treatment with filtrates of *Vibrio cholerae* or extracts of pneumococcus furnished dialysable sialic acid and some N-acetylhexosamine. Increases in hypiodite reducing values following this enzyme action suggested that sialic acid is attached to the mucoid core through its reducing group. This was confirmed by studying the behavior of mucoid bound and free sialic acid in the presence of sodium borohydride. N-acetylhexosamine, found present in the hydrolysate, was due to the degradation of sialic acid.

Methyl sialate was also isolated from acid hydrolysates of cow colostrum, having properties identical to the methyl ester isolated from bovine submaxillary gland. A portion of the sialic acid content of colostrum occurs as a dialysable trisaccharide, containing lactose at the reducing end. The demonstration of sialic acid in cow colostrum establishes the identity of sialic acid with lactaminic acid.

78 pages. \$2.00. Mic 57-2654

THE EFFECT OF CORTISONE AND OTHER ANTI-INFLAMMATORY AGENTS UPON TRANSAMINASE ACTIVITY OF RAT TISSUE

(Publication No. 21,950)

Margie (Buntain) McCaughey, Ph.D.
University of Arizona, 1957

Supervisor: M. G. Vavich

A study was undertaken to gain more information concerning the effect of cortisone and other anti-inflammatory agents upon the aspartic-glutamic transamination action in rat tissue.

The amino acids involved in the reactions were determined by microbiological assays, and the alpha-keto acids were separated electrophoretically as the phenylhydrazones and determined by means of a photodensitometer.

Adult male rats were used as the experimental animals and were injected daily by intramuscular injection with an anti-inflammatory agent.

In vitro studies showed no appreciable effects of cortisone and other agents upon the transaminase activity of rat

tissue at low concentrations, but some repression was noted at high concentrations. *In vivo* studies indicated that the anti-rheumatic drugs somewhat stimulated the rate of transamination in liver tissue at low concentrations, while high concentrations appreciably repressed the transamination reaction.

In vivo studies also showed an increase in the liver weight along with a severe decrease in body weight in cortisone-treated rats. In addition, the protein, non-protein, and alpha-amino nitrogen contents of the livers of rats injected with cortisone were increased. Dietary addition of thiamine, pyridoxine, and vitamin B₁₂ did not counteract the effects of cortisone.

136 pages. \$2.00. Mic 57-2655

METABOLIC REACTIONS IN ERYTHROCYTE GHOSTS

(Publication No. 21,741)

William Leonard McLellan, Jr., Ph.D.
Boston University Graduate School, 1957

Major Professor: Associate Professor Fabian J. Lionetti

The purpose of this study was to elucidate the extraglycolytic pathways of metabolism in the erythrocyte, mainly through the study of the metabolism of nucleosides in the erythrocyte ghost: and to study the effect of hemolysis on the metabolism of the erythrocyte.

The structure, function and metabolism of the erythrocyte are reviewed. Work done by other investigators on the effects of nucleosides on erythrocyte preservation and metabolism is described.

Erythrocyte ghosts were prepared by hemolysis of the erythrocytes at room temperature for 20 minutes with 6 volumes of water, and isotonicity restored with hypertonic buffer. The ghosts were found to be morphologically intact cells 64% in size, and containing 21% of the hemoglobin of the erythrocyte. Their inability to utilize glucose made ghost suspensions an excellent system for studying the extraglycolytic metabolism of the erythrocyte. Ghosts so prepared were incubated with substrates in a physiological buffer under 95% O₂ and 5% CO₂.

Phosphate was determined with molybdate, pentose with orcinol, ketosugars with cysteine-carbazole. Hypoxanthine and lactic acid were determined by specific enzymatic methods. P³² was counted in an end window Geiger-Mueller counter. Phosphate esters were separated by anion exchange chromatography and quantiated.

Nucleosides were found to stimulate the uptake of inorganic phosphate by the ghosts and red cells. Activation energies of 26,000 (cal./mole) for red cells, 19,000 for ghosts, and 9,000 for cell free hemolysates confirmed the uptake of inorganic phosphate as a metabolic process. The esterification of phosphate resulted from the action of nucleoside phosphorylase. This enzyme was distributed between the ghost and hemolysate, and split inosine and guanosine with the production of hypoxanthine and guanine. Adenosine gave rise to hypoxanthine by being first deaminated to inosine.

The pentose of the nucleoside was found to be metabolized. Accumulation of ketopentose and ketohexose was

shown. Ribose-5-phosphate was metabolized with the production of the same products, indicating that this ester is a metabolic intermediate in the metabolism of nucleosides. Column chromatographic separations of trichloroacetic acid extracts of ghost suspensions incubated with inosine indicated that the anaerobic portion of the hexosomonophosphate shunt was the mechanism for the utilization of the pentose of nucleosides. Ribose-5-phosphate and ribulose-5-phosphate accumulated in the system and were further metabolized. Fructose-6-phosphate and fructose diphosphate accumulated. There was no buildup of sedoheptulose phosphate or glyceraldehyde phosphate in the ghost, these esters being apparently transient in the system. The major products accumulating in the ghost were monophosphoglyceric acid and diphosphoglyceric acid. These compounds were very slowly metabolized to lactic acid. The time variation of specific activities of phosphate was consistent with the phosphorolytic cleavage of inosine to ribose phosphate. Ribose phosphate was converted to fructose-6-phosphate which was metabolized to glucose-6-phosphate and fructose diphosphate. The specific activities of phosphoglyceric acid were appreciably higher than fructose diphosphate in the first hour and a half of the incubation, indicating that the production of triose resulted from reactions other than the aldolase splitting of hexose diphosphate. Large changes in specific activities of phosphate of the adenine nucleotides indicated their involvement in metabolism. Increases in the specific activities of adenylic acid show a possible synthesis of this compound from nucleoside, despite a total net decrease in adenine nucleotides.

Assay of specific enzymes in the ghost demonstrated that hemolysis of erythrocytes caused a loss of hexokinase and a "lesion" in enzymes converting phosphoglyceric acid to lactic acid. The existence of organized metabolism in the ghost indicates the importance of the membrane in the metabolic activity and functioning of the red cell. Further, the established presence and turnover of a group of phosphate esters resulting from phosphorylytic cleavage of nucleosides shows a well delineated anaerobic hexose monophosphate shunt to exist in the human erythrocyte.

170 pages. \$2.25. Mic 57-2656

THE RADIATION INDUCED OXIDATION OF HYDROQUINONES IN AQUEOUS SOLUTIONS

(Publication No. 21,813)

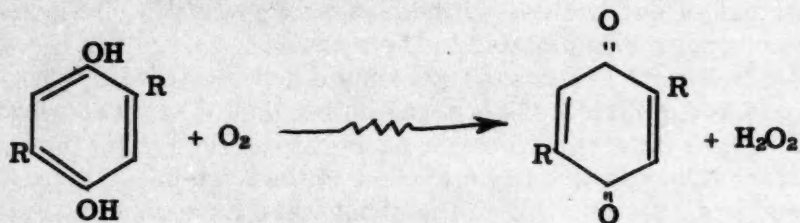
Benon H. J. Przybielski, Ph.D.
Columbia University, 1957

Detailed studies of the effect of ionizing radiation on aqueous solutions of ferrous iron have provided a rational basis for the study of other chemical systems under similar conditions. Previous studies have shown that the radiation induced oxidation of ascorbic acid to dehydroascorbic acid can be explained in terms of the mechanism of the ferrous-ferric system.

These results indicated that it should be possible to extend this type of experiment to aqueous systems containing other organic solutes. Consequently, the effect of Co⁶⁰ gamma radiation on aqueous solutions of several hydroquinones was investigated. The hydroquinones chosen were 2,5-dimethyl-p-hydroquinone, 2,5-dichloro-p-hydroquinone,

p-hydroquinone, toluhydroquinone and 4-t-butyl-catechol. Spectrophotometric rate studies of the radiation induced oxidation of these compounds in 0.8 N sulfuric acid were carried out.

When 2,5-dimethyl-p-hydroquinone and 2,5-dichloro-p-hydroquinone were irradiated in the presence of air, the following stoichiometry was found:



On the basis of the observed stoichiometry and the accepted chemical yields in 0.8 N sulfuric acid solution, mechanisms for the oxidation of the two compounds have been proposed. These mechanisms suggest an initial oxidation of the respective hydroquinone to the semiquinone by the OH radical produced in the aqueous system by ionizing radiation. The stoichiometric data obtained indicate that in the case of 2,5-dimethyl-p-hydroquinone the HO_2 radical is a strong enough oxidizing species to complete the oxidation reaction, while in the case of 2,5-dichloro-p-hydroquinone the HO_2 is not capable of oxidizing the semiquinone. For the latter compound a disproportionation mechanism is postulated.

It has been found that p-hydroquinone and toluhydroquinone undergo two reactions under the effect of ionizing radiation. One reaction is the two electron oxidation of the hydroquinone to the corresponding quinone, and the other is the introduction of a hydroxyl group to give the hydroxyquinone. Under deaerated conditions, no hydroxylation could be detected.

Oxidation of 4-t-butyl-catechol to the corresponding 4-t-butyl-o-quinone occurs under these conditions. Although the behaviour of this compound is different from that of the 2,5-disubstituted-p-hydroquinones, the overall stoichiometry of the reaction was determined. Attempts to correlate the results with the known chemical yields of the ferrous-ferric system were unsuccessful.

92 pages. \$2.00. Mic 57-2657

METABOLIC INTERRELATIONSHIPS OF VITAMINS E AND B_6

(Publication No. 21,958)

Jerry Monroe Young, Jr., Ph.D.
University of Arkansas, 1957

Major Professor: James S. Dinning

The effects of deficiencies of both vitamins E and B_6 on rats were studied in order to determine if an interrelationship existed between these two vitamins.

Weanling Sprague-Dawley rats were divided into four groups and placed on a basal diet. One group was deficient in vitamin E, one in vitamin B_6 , one in both vitamins E and B_6 and the control group which received supplements of both E and B_6 . They remained on this diet 114 days.

The rats on the basal diet ate less, although their

weight gain was quite close to the animals deficient in vitamin B_6 , but supplementation of the diet resulted in an increase in food consumption.

The group deficient in both vitamins had an increase in creatine excretion which was approximately double that of the other groups starting at the 45th day and lasting until the termination of the experiment.

The control group excreted an average of approximately four mg of allantoin per kilo per day while the groups deficient in either B_6 or E excreted about six mg per kilo per day and the group deficient in both vitamins excreted twice that of the control group. The rise in both creatine and allantoin began about the same time.

Both groups deficient in vitamin B_6 showed a greatly increased urinary xanthurenic acid excretion after the administration of DL-tryptophane, while the two groups receiving vitamin B_6 had no appreciable change.

The only change in liver xanthine oxidase activity was a reduction in activity of the animals deficient in Vitamin B_6 . The inclusion of vitamin E in the diet seemed to cancel the above reduction in this activity.

The rats in this study exhibited a syndrome which is similar to that seen in vitamin E deficient rabbits. The rats deficient in vitamin E showed an elevated urinary creatine and allantoin excretion as do the rabbits. The liver xanthine oxidase activity of vitamin E deficient rabbits is elevated over comparable controls, while no significant change was observed in this experiment.

Perhaps the most important point to be made from these experiments is the similarity between the syndromes of vitamin E deficiency in the rabbit and the combined deficiency of vitamins E and B_6 in the rat. Under both conditions, one observes the syndrome of nutritional muscular dystrophy.

72 pages. \$2.00. Mic 57-2658

CHEMISTRY, INORGANIC

STUDIES IN FLAME SPECTROPHOTOMETRY

(Publication No. 21,843)

Benny Lee Beck, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Villiers W. Meloche

Flame spectrophotometry is being widely used in the determination of alkali and alkaline earth metals. In some cases, it may also be used for analysis of other metals and even non-metals. This investigation includes (1) brief studies of several metals other than the alkalis and alkaline earths, (2) a study of the interference and effects which various anions produce on the emission of metals, and (3) a study of the use of organic solvents in flame spectrophotometry.

The main instrument used in this work was previously built here in the laboratory. It is basically a Beckman Model DU Flame Spectrophotometer. A more complete and stable electrical circuit was substituted. A recorder and wavelength drive mechanism are included, along with precision pressure gauges and rotometers. An oxyhydrogen burner was used throughout most of the investigation.

Preliminary studies involving sensitivity and

interference of the following metals are included: gallium, the platinum metals, aluminum, chromium, manganese, cobalt, nickel, gold, mercury, and bismuth.

A method was developed for the flame spectrophotometric determination of gallium in copper-gallium alloys. The 417.2 mμ line was used.

Of the platinum metals, palladium and rhodium were found sensitive enough for practical flame spectrophotometric analysis. Ruthenium exhibits several weak emission lines, but was not investigated.

Aluminum is very insensitive to flame excitation. However, with the aid of the sensitive instrument employed, a study of this element was possible. The 484.2 mμ AlO band was used.

Chromium exhibits six relatively strong emission lines in the flame. The strongest at 425.4 mμ was used.

The 279.5 mμ line of manganese was investigated and was found to be quite free of interference from radiation of other metals. Although this line is less sensitive than the 403.3 mμ line, it might be preferred in some cases.

Several lines of cobalt and nickel were found in their flame spectra. However, all are in the "line rich" portion of the spectrum and suffer from direct radiation interference from many other metals with which they are often associated.

Gold, mercury, and bismuth emit very weak radiation in the flame. The strongest lines of gold and mercury appear at 267.6 and 253.6 mμ respectively. They are relatively free of interference, since few elements emit strongly in this wavelength region. However, the lowest range determinable with accuracy was 0-1000 p.p.m.

Anions are a great source of interference in flame spectrophotometry even though they themselves may not emit radiation. Sulfate and phosphate ions were found to show inhibitory effects on the emission of metals. In general, chloride and nitrate showed little effect. The combined effect of two anions was found not to be necessarily intermediate between the effects of each of the two anions alone. The effects of anions were found to be relatively the same whether measuring the atomic line or the oxide band emission of the metal.

Organic solvents were found to greatly affect the flame spectrophotometric emission. Aspiration rate was found to be the most influential factor. The viscosity of the solvent is primary in determining the aspiration rate. A linear relationship was found between the temperature of the flame and the intensity of the 308.9 mμ OH band. The temperature of the flame was found to be primarily influenced by the cooling effect on the flame by the solvent as it passed through the burner. Solvents with fast aspiration rates exhibited lower temperature flames. The emission of the solvents themselves was also examined.

APPENDIX

Since a recording instrument was available, spectra were prepared for thirty-two elements.

162 pages. \$2.15. Mic 57-2659

SPECTROPHOTOMETRIC DETERMINATION OF CHLORIDE ION

(Publication No. 21,987)

Hans Coll, Ph.D.

Louisiana State University, 1957

Supervisor: Professor Philip W. West

Methods for the quantitative determination of chloride ion have been reviewed. A direct spectrophotometric method with iron(III) perchlorate as the reagent has been developed. This method is based on the formation of the monochloro complex of iron(III) in solutions of appreciable perchloric acid concentration. Chloride ion may be determined in a concentration range of 4 to 50 p.p.m. by measuring the absorbancy of the complex around 350 mμ. Interferences from other ions are not significant, and the determination may be carried out in the presence of other halides. The usefulness of the spectrophotometric method in water analysis has been demonstrated in a comparative study with standard titrimetric procedures. The method has further been adapted for the determination of chloride in air.

The complex FeCl^{++} has been identified as the species responsible for the absorption band at 350 mμ. Apparent stability constants of this complex have been determined at various concentrations of perchloric acid. It was found that the stability constant (K) increased from 4.2 (in 2.5 M acid) to 6.1×10^3 (in 9.0 M acid). Solutions which contained blends of perchloric acid with sodium and magnesium perchlorate, respectively, were included in this study. A plot of log K vs. perchlorate ion concentration resulted in separate curves for the acid and the salt blends. From the change of K with temperature, standard enthalpy and entropy changes have been determined for solutions of 3.0 and 8.5 M perchloric acid. A partial explanation for the dependence of the stability of the chloro complex on the composition of the medium has been given in terms of the dehydrating action of perchlorates.

With regard to the findings of this investigation the existence of iron(III) perchlorate complexes appears to be questionable.

A brief discussion of the photosensitivity of iron(III) complexes has been given. Photoreduction of iron(III) and formation of Cl as a result of electron transfer from ligand to central atom explains the disappearance of the complex upon exposure to light, an effect, which was found to be more pronounced at higher acid concentrations.

112 pages. \$2.00. Mic 57-2660

SOME APPLICATIONS OF o-AMINO- BENZENETHIOL IN INORGANIC ANALYSIS

(Publication No. 21,881)

Thomas Edward Hamm, Ph.D.

The University of Oklahoma, 1957

Major Professors: Bernard O. Heston and Ernest E. Byrn

Introduction and Literature Survey. Preparation of o-aminobenzenethiol was described at least as early as 1930.

Since that time some study of this compound has been made in work of a general nature that sought to establish some factors controlling the selectivity of organic reagents, and several metal salts of the reagent have been prepared. This paper presents the results of some investigations aimed at quantitative determinations of metal ions in complex mixtures by use of the reagent.

Preliminary Work. Solutions of thirty-six different ions were prepared and treated with various common reagents and with *o*-aminobenzenethiol to establish which elements might be determined.

Determination of Bismuth. The reagent *o*-aminobenzenethiol reacts with bismuth in dilute acid solutions to yield a complex compound. When this complex is formed in dilute acid solutions whose pH is less than 1.5, a bright yellow color is developed the intensity of which is proportional to the concentration of bismuth in solution. Photoelectric measurement of this yellow color was used to develop an analytical procedure for the determination of bismuth. Interferences were investigated, and several alloys were analyzed.

When an acid solution containing an appreciable amount of dissolved bismuth-*o*-aminobenzenethiol complex is neutralized to a pH greater than 1.5, a unique, bright orange floc separates out. It was established that this precipitate is quite characteristic and may be useful as a qualitative test for bismuth, but the test is not sensitive for small concentrations. It was established that precipitation with *o*-aminobenzenethiol is not suitable for quantitative gravimetric determination of bismuth.

Determination of Selenium and Tellurium. It was found that *o*-aminobenzenethiol reduces soluble ionic radicals of both selenium and tellurium to acid-insoluble elemental forms of these elements. It was established that the reaction with selenium may be used for semi-quantitative gravimetric determination of this element. Only a qualitative study was made of the reaction with tellurium. Also, a brief investigation was made of a volumetric determination of selenium based upon the appearance, and then the disappearance, of a yellow color that occurs when selenium solutions are titrated with *o*-aminobenzenethiol.

Determination of Silver. It was established that silver may be determined by its quantitative gravimetric precipitation in 5 per cent nitric acid with *o*-aminobenzenethiol. Gold and copper interfere.

114 pages. \$2.00. Mic 57-2661.

MECHANISMS OF ELECTROCHEMICAL REDUCTION OF PHENYL KETONES

(Publication No. 21,669)

Joseph Thomas Leone, Ph.D.
University of Michigan, 1956

The purpose of this investigation was to evaluate the mechanisms advanced in the literature for the electroreduction of phenyl ketones at the D.M.E. Two major failings of these mechanisms are (1) their specificity and (2) non-evaluation of environmental influences. This investigation has enabled the author to postulate a new mechanism which explains the published data as well as the work done in this laboratory. In addition, phenacyl fluoride

was investigated in order to study carbon-fluorine bond fission at the D.M.E. A mechanism is presented to explain the pH-dependence observed in acidic media.

In Part I six ketones (benzophenone, acetophenone, propiophenone, *n*-butyrophenone, *i*-butyrophenone and pivalophenone) were studied polarographically and coulometrically. These ketones exhibited the following general behavior: (1) in acidic media all ketones gave at least one cathodic wave and indications of a second one; benzophenone gave two waves. The waves (one-electron) were all diffusion-controlled. (2) the first or single wave became more negative as the pH increased (pH-dependent) while the second wave was pH-independent (constant E_1). (3) The current constant, I , increased to a maximum (ca. pH 9) and then decreased with increasing pH. There was only one wave observable above pH 6; this wave was pH-dependent and approximately equal in height to the sum of the waves which appeared or were indicated in the more acidic region (two electrons). (4) The only products isolable were pinacol (wave I in acidic media and above pH 9) and carbinol (wave II and the "combined" wave between pH 6 and 9).

The electrochemical reduction of ketones is best explained by a free radical mechanism, which is operative over the entire pH range. The waves which commonly appear in acidic media are explicable by the following process: (1) the ketone diffuses into the electrode field and the carbonyl group becomes polarized; (2) simultaneously, the carbonyl oxygen (now partially charged) attracts a proton, which process favors increased polarization; (3) the protonated ketone completes the diffusion into the electrode interphase and acquires an electron. The acquisition of the first electron results in the first wave when a pair of waves is observed or in a single wave when the second is obscured by buffer discharge; the free radical produced dimerizes to pinacol. The second wave observed in acidic media results from the one-electron reduction of the free radical at a more negative potential, the main product being the carbinol. Due to the pH-dependence of the first wave the first and second waves merge into the "combined" wave.

In alkaline media the mechanism is essentially the same. However, since there is a scarcity of protons, carbinolate free radical ion is formed along with the carbinol free radical. A comparison of the structures of the two free radicals, $(R'R)C\cdot OH$ and $(R'R)C\cdot O^-$, makes readily apparent the fact that the free radical anion will not be reducible at its formation potential. These phenomena account for the decrease in magnitude of the "combined" wave and the appearance of a third, more negative wave.

In addition to the investigation of carbonyl group reduction, a study was made of the carbon-fluorine bond fission in phenacyl fluoride (Part II). The latter gave two well-defined, diffusion-controlled cathodic waves. The first wave resulted from the fission of the carbon-fluorine bond (fluoride was isolated and identified) and the second wave resulted from the reduction of acetophenone (see above), which resulted from the carbon-fluorine bond fission (wave I). The rupture of the carbon-fluorine bond in phenacyl fluoride is not only the first case of carbon-fluorine bond fission at the D.M.E. but also is the first instance in which the carbon-halogen bond fission per se was found to be pH-dependent.

A mechanism involving hydrofluoric acid in the transition state or species has been postulated to explain the

observed pH-dependence of carbon-fluorine bond fission below pH 6. The pH-independent reduction of the carbon-fluorine bond above pH 6 simply involves the transfer of two electrons from the electrode with the simultaneous generation of fluoride ion, i.e., a carbanion and fluoride ion are produced. The carbanion, which also results in the case of the pH-dependent fission, immediately picks up a proton to form acetophenone, which is subsequently reduced at a more negative potential.

141 pages. \$2.00. Mic 57-2662

CHEMISTRY, ORGANIC

STUDIES TOWARD THE SYNTHESIS OF YOHIMBE ALKALOIDS

(Publication No. 21,774)

Lewis Maurice Berkowitz, Ph.D.
Columbia University, 1957

A review of the stereochemistry and biogenesis of yohimbine and its isomers is presented. In both instances, the literature is covered through early 1957.

Several syntheses of yohimbine were attempted. They may be divided into two classes: A. those starting from rings D and E and B. those starting from rings A, B and C.

a. The attempted Birch reduction of 6-methoxy-1,2,3,4-tetrahydroisoquinoline-3-carboxylate to 6-keto-1,2,3,4,6,7,8,9-octahydroisoquinoline-3-carboxylate failed. The product was uncharacterizable.

An attempt to prepare the above α,β -unsaturated ketone by a methyl vinyl ketone condensation on N-benzoyl-2,5-dicarbethoxy-4-piperidone was unsuccessful because of the difficulty of obtaining the β -keto-ester unaccompanied by isomers.

The synthesis of N-benzoyl-4,6-dicarbethoxy-3-piperidone was realized as was its condensation with methyl vinyl ketone, but attempts to close the diketone to N-benzoyl-7-keto-1,2,3,4,5,6,7,10-octahydro-3-carbomethoxy-isoquinoline led to non-ketonic material whose properties suggested an amino-acid.

b. The condensation of 1,2,3,4-tetrahydro- β -carboline-1-acetic ester and the diethyl ketal of diethyl- α -keto- α' -formyl-glutarate was undertaken but the resultant unsaturated amine could not be reduced under the conditions necessary to preserve the ketal function.

We synthesized 3"-methoxy-3,4,6,9-tetrahydro-7,8-benzindolo-(2',3'-1,2)-quinolizine both by the method of Swan and by a new method utilizing the sequence: m-methoxy-phenylacetic ester, 6-methoxy- β -isochromanone, 2-chloro-methyl-5-methoxy-phenyl-acetic ester, the lactam of the above ester and tryptamine, closure via the method of Stork and Hill to the unsaturated amine and catalytic reduction to the Swan base.

In a series of collateral experiments, we synthesized, in low yield, 6-methoxy-isoquinoline via the Pictet-Gams closure of the appropriate formamido-formate ester.

Reduction by the Birch procedure of the Swan base to the unsaturated ketone proceeded only if the conditions were more vigorous than reported. Carbonation of this ketone using t-butyl alcohol and CO_2 did not occur. The recovered ketone had the same ultra-violet spectrum but

differences in the infra-red spectrum in the 7-12 region indicated isomerization of the starting ketone.

92 pages. \$2.00. Mic 57-2663

THE SYNTHESIS OF 1,4-DIALKYL-4-ARYLPYPERIDINES

(Publication No. 21,846)

David Henry Clemens, h.D.
The University of Wisconsin, 1957

Supervisor: Professor S. M. McElvain

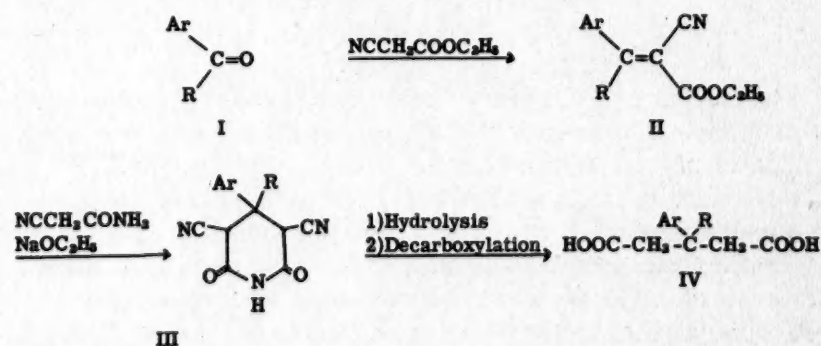
A series of 1,4-dialkyl-4-arylpiperidines (VII) were synthesized and screened for analgesic activity. A new method was developed for synthesis of β -alkyl- β -arylglutaric acids (IV), the key intermediates in the following reaction sequence by which the 1,4,4-trisubstituted piperidines were obtained.

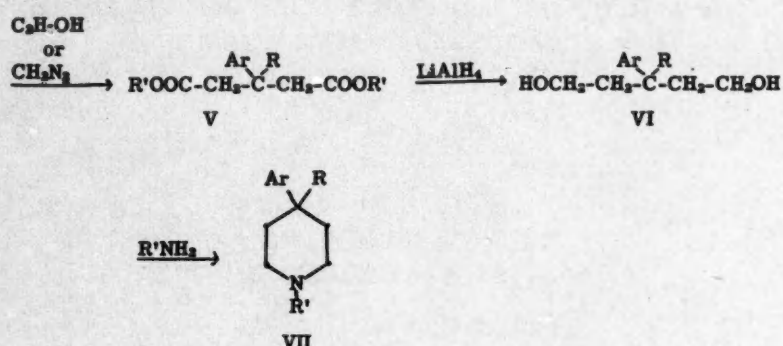
Various alkyl aryl ketones (I) were condensed with ethyl cyanoacetate to yield the corresponding ethyl 1-aryl-alkylidenecyanoacetates (II). The unsaturated cyanoesters II were then condensed with cyanoacetamide in the presence of sodium ethoxide to yield the corresponding β -alkyl- β -aryl- α,α' -dicyanoglutarimides (III) which were hydrolyzed and decarboxylated to the β -alkyl- β -arylglutaric acids (IV). These were converted to the corresponding dimethyl or diethyl esters V and reduced with lithium aluminum hydride to the 3-alkyl-3-arylpentane-1,5-diols (VI). These diols were converted to 1,4-dialkyl-4-arylpiperidines (VII) by condensation with the appropriate amine in the presence of copper chromium oxide.

Holding the aryl substituent of VII constant as phenyl and R' as methyl, the 4-alkyl group was varied from methyl to n-propyl. Then, keeping the aryl substituent constant as phenyl and R as methyl, the N-alkyl group was varied from methyl to n-butyl. Although some of these compounds produced a trace of analgesia in rats, none produced any significant effect.

Introduction of a m-hydroxyl or m-methoxyl group into the aryl substituent of VII markedly enhances the analgesic activity. (VII, R = CH_3 , Ar = $\text{C}_6\text{H}_4\text{OH}(m)$, R' = CH_3), (VII, R = n- C_3H_7 , Ar = $\text{C}_6\text{H}_4\text{OH}(m)$, R' = CH_3) and (VII, R = n- C_3H_7 , Ar = $\text{C}_6\text{H}_4\text{OCH}_3(m)$, R' = CH_3) all produced profound analgesia in rats at quite low dose levels. In addition, the first of these compounds showed only slight toxicity at thirty times the effective analgesic dose.

It is interesting to note that shifting the hydroxyl or methoxyl group of the aryl substituent of VII from the meta to the ortho or para position results in an almost complete loss of analgesic activity.





77 pages. \$2.00. Mic 57-2664

NITRATION OF THE BENZENESULFONATE OF 2-HYDROXYBIPHENYL

(Publication No. 21,971)

D. Paul Denny, Ph.D.
The University of Oklahoma, 1957

Major Professor: J. C. Colbert

Experimental findings in the field have established that direct nitration of 2-hydroxybiphenyl fails to introduce the nitro group into the 4'-position. Nitration of the benzenesulfonate of this compound, however, leads to substitution in this position. The present investigation has shown that the 2'-nitro ester is also formed. Optimum conditions for production of the two isomers are given. Chromatographic separation of nitrated products following hydrolysis of the ester has been accomplished. Proofs of structure are based on chromic acid oxidation to para and ortho-nitrobenzoic acids and upon conventional nitrogen analysis. Further nitration of the 4'-mononitro derivative with fuming nitric acid, using glacial acetic acid as the solvent, leads to 3,5,4'-trinitro-2-hydroxybiphenyl, a known structure, or, with lower acid-strength nitration mixtures, to two unique dinitro structures bearing one nitro group on each ring. Each of these dinitro compounds upon further nitration yields 3,5,4'-trinitro-2-hydroxybiphenyl. Further nitration of the 2'-isomer leads to one dinitro derivative bearing one nitro group on each ring, or, with higher acid-strength nitration mixtures, to one trinitro derivative assumed to be 3,5,2'-trinitro-2-hydroxybiphenyl. Further nitration products are separated by chromatographic methods. Sodium polysulfide, in either alcoholic or aqueous media, fails to preferentially reduce dinitro derivatives of 2-hydroxybiphenyl in which each ring bears one nitro group.

93 pages. \$2.00. Mic 57-2665

THE UTILIZATION OF α -OXIMINO KETONES IN THE PFITZINGER REACTION

(Publication No. 21,032)

Raymond Lewis Etter, Jr., Ph.D.
The University of Texas, 1957

Supervisor: Dr. H. R. Henze

Seven oximino-alkyl ketones were resynthesized and the existing data corroborated and in some cases expanded. Each oximino ketone was converted into the corresponding dioxime.

The structure of the compound reported in the literature as 1-oximino-2-pentanone has been shown to be that of 3-oximino-2-pentanone; infrared spectra were determined for both compounds and proved to be identical. An unambiguous synthesis of 1-oximino-2-pentanone was accomplished.

Six of the oximino-alkyl ketones were utilized in the Pfitzinger reaction to produce a new series of 2-(α -oximinoalkyl)cinchoninic acids. Five new cinchoninic acids were obtained:

- 2-(α -oximinoethyl)cinchoninic acid
- 2-(α -oximinopropyl)cinchoninic acid
- 2-(β -methyl- α -oximinopropyl)cinchoninic acid
- 2-(α -oximinoethyl)-3-methylcinchoninic acid
- 2-(α -oximinopropyl)-3-ethylcinchoninic acid

In the case of 2-(α -oximinopropyl)cinchoninic acid and 2-(α -oximinoethyl)-3-methylcinchoninic acid, two different forms were isolated which were concluded to be *syn* and *anti* isomers. Acetyl and ester derivatives were prepared from several of these acids.

Two new acyl cinchoninic acid derivatives, 2-acetylcinchoninic acid and 2-propionylcinchoninic acid, were prepared from 2-(α -oximinoethyl)cinchoninic and 2-(α -oximinopropyl)cinchoninic acids, respectively. This conversion was accomplished by the transference of the oximino group of the cinchoninic acid to the more reactive carbonyl group of pyruvic acid.

A Beckmann rearrangement was carried out upon 2-(α -oximinopropyl)cinchoninic acid, with indication that the later is in the *syn*-quinoline-*anti*-alkyl form.

Ultraviolet absorption spectra were determined for all of the 2-(α -oximinoalkyl)cinchoninic acids, the acylcinchoninic acids, and certain other related quinolines. The significance of the absorption maxima was pointed out.

Infrared absorption spectra were determined for all of the 2-(α -oximinoalkyl)cinchoninic acids, 2-acetylcinchoninic acid, and certain other known oximes and quinolines. By a systematic correlation of these spectra, positions of absorptions for the groups present were obtained. These data add significantly to the existing data on these types of compounds, especially the data on the absorption of the oximino grouping; it was established that the C=N of the oximino group absorbs at a different wavelength than did the C=N of quinoline. An inspection of the infrared absorption spectra of the oximinoalkylcinchoninic acids revealed an unexpected fact; namely, that the carboxyl groups seemed to be mainly in the form of carboxylate ions instead of as "free" carboxyls.

94 pages. \$2.00. Mic 57-2666

I. THE MONOKETO- AND
MONOHYDROXYTETRADECANOIC ACIDS.
II. A METHOD FOR THE SYNTHESIS OF LONG-
CHAIN ODD-CARBON DICARBOXYLIC ACIDS.
THE SYNTHESIS OF NONACOSANEDIOIC ACID.

(Publication No. 21,853)

Samuel Agee Fuqua, Jr., Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor H. A. Schuette

Part I

The twelve isomeric monoketotetradecanoic acids and the thirteen isomeric monohydroxytetradecanoic acids have been synthesized. Of these, three keto acids and eight hydroxy acids have not been previously prepared. The infrared spectra and melting points of the acids are discussed and compared with the similar series of the keto- and hydroxyhexadecanoic acids, prepared by Soukup (Ph.D. Thesis, University of Wisconsin, 1953), and the keto- and hydroxyoctadecanoic acids prepared by Bergstrom *et al.* [Acta Chem. Scand. 6, 1157 (1952)].

The keto acids substituted in positions 4 through 12 were prepared by coupling the appropriate cadmium dialkyl with the half-ester acid chloride of a dibasic acid. The α -hydroxy, β -keto and 13-keto acids were prepared as previously described in the literature. Chromic acid oxidation of the α -hydroxy acid gave the α -keto acid.

The 4- through 13-hydroxy acids were quantitatively prepared by the sodium borohydride reduction of the keto acids. A procedure is given whereby the neutral equivalent determination of the keto acid and its reduction can be carried out in one simple operation. The 4-hydroxy and 5-hydroxy acids have been obtained in lower yield because of lactone formation. However, the lactones can be reconverted to the hydroxy acids. The β -hydroxy acid was prepared in 65% yield by the sodium borohydride reduction of a slightly alkaline solution of the β -keto ester.

12-Ketotetradecanoic acid has also been synthesized in 16% yield by the addition of propionaldehyde to methyl undecylenate in the presence of the free-radical catalyst, benzoyl peroxide. This acid is identical with the 12-keto acid prepared by the cadmium dialkyl synthesis.

Part II

A method has been developed for the synthesis of long-chain odd-carbon dicarboxylic acids, with $2n+9$ carbon atoms, from lower molecular weight dicarboxylic acids, with n carbon atoms. In this procedure dithienylmethane, formed from thiophene and trioxane, is diacylated with the half-ester acid chloride of the lower diacid. The resulting 2,2'-methylene-bis-5-(ω -carbomethoxyalkanoyl)thiophene is converted to the bisethylenethioketal by treatment with ethanedithiol in the presence of either hydrogen chloride or boron trifluoride-etherate. Saponification, of this bis-thioketal diester, followed by desulfurization with Raney nickel, and then acidification yields a straight-chain odd-carbon dicarboxylic acid.

The method has been used to synthesize nonacosanedioic acid ($n=10$) from the half-ester acid chloride of sebacic acid in 22% over-all yield.

The method can also be used to prepare straight-chain fatty acids. Thus, acylation of thiophene with 9-carbomethoxynonanoyl chloride, formation of the ethylenethioketal

with ethanedithiol, saponification and desulfurization yielded myristic acid.

The ultraviolet and infrared spectra of the intermediate thiophene compounds have been studied and prove to be very useful tools in following the course of the reactions.

195 pages. \$2.55. Mic 57-2667

CHEMISTRY OF THE
TRIPHENYLMETHYL GROUP
(PARTS I-III)

(Publication No. 21,285)

Rex B. Gosnell, Ph.D.
Purdue University, 1957

Major Professor: Dr. Robert A. Benkeser

Chemistry of the Triphenylmethyl Group

Part I- The Question of Orientation in the Introduction of the Triphenylmethyl Radical Into Aromatic Solvent Substrates. Tritylation of Aromatic Rings Containing Deactivating Groups.

Triphenylcarbinol undergoes condensation with *o*-chloroaniline, *o*-nitroaniline, and anthranilic acid in the presence of hydrochloric acid. In each case the triphenylmethyl group enters the ring para to the amino group, forming a 3,4-disubstituted tetraphenylmethane. These represent some of the first successful tritylation reactions of rings containing deactivating groups.

In connection with the above findings several errors in the literature have been detected, particularly with regard to the structural assignments of *m*- and *p*-triphenylmethylbenzoic acid. As a consequence, the inference [H. Wieland and A. Meyer, Ann., 551, 249 (1942)] that the triphenylmethyl radical enters exclusively into the para position of various solvent substrates like toluene, chlorobenzene, and methylbenzoate to form para-substituted tetraphenylmethanes has been disproved.

Part II- The Electrical Effect of the Triphenylmethyl Group on an Aromatic Ring.

The rates of the reaction of meta and para-triphenylmethylbenzoic acids with diphenyldiazomethane and the rates of the reaction of meta and para-triphenylmethylphenoxides with ethyl iodide have been determined. From these rate constants and the Hammett equation, the sigma constants of these groups were calculated. The triphenylmethyl group has essentially the same electrical effect on an aromatic nucleus as does hydrogen.

Part III- A Reinvestigation of the Products of the Reaction of Triphenylmethyl Free Radical with Nitrobenzene.

Contrary to a previous report [Hammond and Ravve, J. Am. Chem. Soc. 73, 1891 (1951)], no azobenzene or phenol is produced in the reaction of triphenylmethyl free radical with nitrobenzene. Also, no difference in the products could be observed when the reaction was carried out in the light or in the dark. Triphenylmethylnitrobenzene is not produced in the reaction. 163 pages. \$2.15. Mic 57-2668

SOME ALKYLATION REACTIONS OF GRIGNARD REAGENTS OF SULFONES

(Publication No. 21,661)

John Robert Holsten, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Lamar Field

Three alkyl aryl sulfones and two dialkyl sulfones were converted to their halomagnesium derivatives. One of the alkyl aryl sulfones was converted to its lithium derivative, also. The chemical and physical properties of these organometallic reagents were then examined.

p-Tolylsulfonylmethylmagnesium bromide reacted with *n*-hexyl *p*-toluenesulfonate in benzene to give *n*-heptyl *p*-tolyl sulfone (34%), a new compound. Anisole was a less satisfactory solvent, *n*-heptyl *p*-tolyl sulfone being obtained in only 22% yield. The reaction of *p*-tolylsulfonylmethyl-lithium with *n*-hexyl *p*-toluenesulfonate in benzene offered no advantage (11% yield).

Neither *p*-tolylsulfonylmethylmagnesium bromide in a variety of solvents nor *p*-tolylsulfonylmethyl-lithium in benzene reacted with di-*p*-tolyl disulfide to give the expected *p*-tolylmercaptomethyl *p*-tolyl sulfone. However, a small amount of unidentified material (A), with the apparent empirical formula $C_{15}H_{16}S_2$, was formed in each reaction. The reaction of phenylsulfonylmethylmagnesium bromide with diphenyl disulfide gave neither phenylmercaptomethyl phenyl sulfone nor a crystalline product resembling substance A.

The reaction between *p*-tolylsulfonylmethylmagnesium bromide and methoxyamine should, presumably, give the unstable α -aminosulfone, *p*-tolylsulfonylmethylamine. Hydrolysis of this presumed intermediary α -aminosulfone would give formaldehyde and *p*-toluenesulfinic acid. The subsequent isolation and identification of these hydrolysis products would serve to identify the original sulfone, methyl *p*-tolyl sulfone. The over-all sequence of reactions, then, might be developed into a useful method of degradation and identification of alkyl aryl as well as dialkyl sulfones. The development of such a procedure, and also the demonstration of the reaction between the Grignard reagent of a sulfone and methoxyamine were the purposes of a series of reactions of methoxyamine with the Grignard reagents of methyl *p*-tolyl, benzyl *p*-tolyl and di-*n*-propyl sulfones. However, the degradation was found to be insufficiently smooth to be of value except under unusual circumstances.

The sequence of reactions with methoxyamine which was initiated with methyl *p*-tolyl sulfone resulted in crude *p*-toluenesulfinic acid in yields as high as 50-52%, but formaldehyde could be isolated only in trace amounts as its dimedon derivative.

Hydrolysis of the reaction mixture resulting from the reaction of methoxyamine and the Grignard reagent of benzyl *p*-tolyl sulfone gave benzaldehyde (14% yield, as its 2,4-dinitrophenylhydrazone) and *p*-toluenesulfinic acid (7% yield, as its 2,4-dinitrophenyl derivative). Omission of methoxyamine from a control reaction sequence with the Grignard reagent of benzyl *p*-tolyl sulfone resulted in *p*-toluenesulfinic acid (14%, as its 2,4-dinitrophenyl derivative), but no benzaldehyde.

Although the mixture resulting from the reaction of methoxyamine and the Grignard reagent of di-*n*-propyl

sulfone, followed by hydrolysis, gave no *n*-propionaldehyde 2,4-dinitrophenylhydrazone, *n*-propanesulfinic acid was isolated (6%, as its 2,4-dinitrophenyl derivative).

Previous reactions involving Grignard reagents of sulfones have been characterized as being heterogeneous because of the insolubility of the sulfonyl Grignard reagents in the solvents used. Tetrahydrofuran was found to dissolve the Grignard reagent of methyl *p*-tolyl sulfone, thus making it possible to use this Grignard reagent in a homogeneous reaction mixture for the first time. The Grignard reagent of dimethyl sulfone was insoluble, however, in tetrahydrofuran; furthermore, its unsatisfactory reaction with benzaldehyde in tetrahydrofuran indicates that tetrahydrofuran is unlikely to be an effective solvent for addition reactions.

The possibility that the strongly electronegative sulfonyl group might polarize the carbon to magnesium bond in a sulfonyl Grignard reagent sufficiently to impart ionic character to the bond seemed worth investigating. If the bond were ionic in nature, the sulfonyl Grignard reagent would undergo reactions similar to those of salt-like enolates such as diethyl sodiomalonate. However, *p*-tolylsulfonylmethylmagnesium bromide did not react with *n*-hexyl iodide to give *n*-heptyl *p*-tolyl sulfone as would be expected from a salt-like reactant; therefore indicating that the Grignard reagents of sulfones resemble conventional Grignard reagents more than they do salt-like enolates.

100 pages. \$2.00. Mic 46-2669

SOME APPLICATIONS OF THE MICHAEL CONDENSATION TO STEROID SYNTHESIS

(Publication No. 21,859)

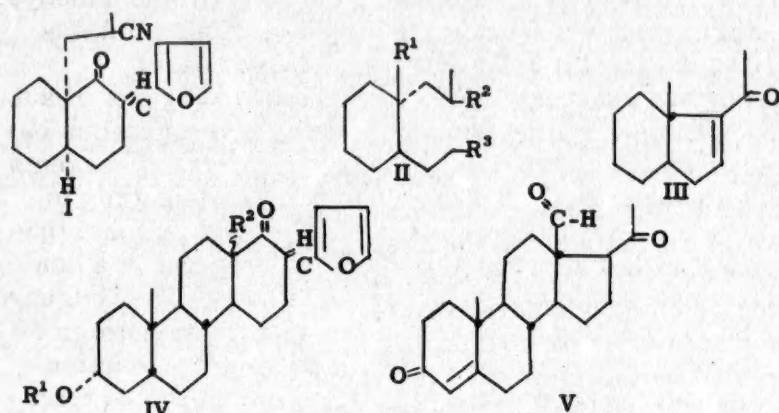
David Glenn Martin, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor William S. Johnson

PART I

The product from cyanoisopropylation of *trans*-furfurylidene-1-decalone was proved to have the *cis* configuration (I) as demonstrated by its conversion into *trans*-acetylmethylhexahydroindene (III) (See W. S. Johnson, D. G. Martin, R. Pappo, S. D. Darling, and R. A. Clement, Proc. Chem. Soc., 58 (1957)). Previous workers had transformed the adduct (I) into the diacid (II: $R^1 = \text{Me}$, $R^2 = R^3 = -\text{CO}_2\text{H}$). In the present work the acid chloride of this diacid was converted into the diketone (II: $R^1 = \text{Me}$, $R^2 = R^3 = -\text{COMe}$ which was rearranged to the diacetate (II: $R^1 = \text{Me}$, $R^2 = R^3 = -\text{OAc}$) with peracid. Saponification gave the diol (II: $R^1 = \text{Me}$, $R^2 = R^3 = -\text{OH}$), which was oxidized and cyclized to the conjugated ketone III. The configuration of this ketone was demonstrated by its conversion via Beckmann rearrangement of the oxime into *trans*-8-methylhydrindanone (W. S. Johnson, J. Am. Chem. Soc., 66, 215 (1944)).

The furfurylidene ketone (IV: $R^1 = -\text{H}$, $R^2 = \beta\text{-H}$) was available through the investigations of previous workers in these laboratories (See W. S. Johnson, J. Am. Chem. Soc., 78, 6278 (1956) and subsequent papers; J. E. Pike Research Report to W. S. Johnson (1954-1955)).

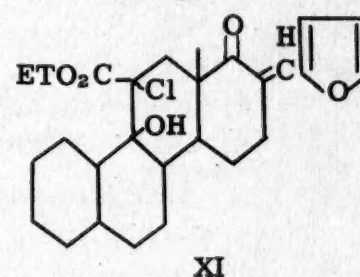
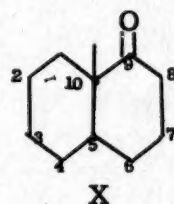
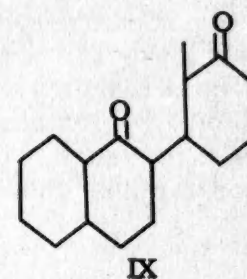
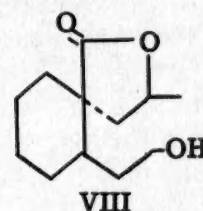
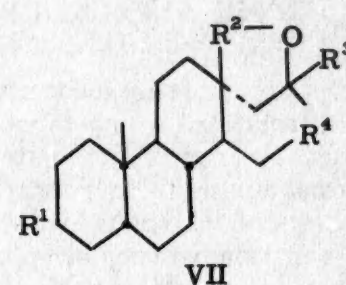
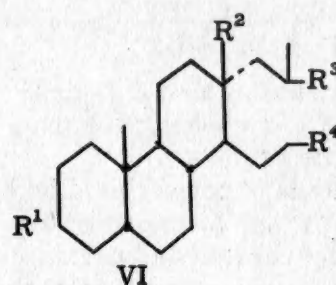


Cyanoisopropylation afforded a single adduct (J. E. Pike, loc. cit.) almost certainly the *cis* adduct (IV: $R^1 = H$, $R^2 = \alpha\text{-CH}_2\text{CH}(\text{Me})\text{CN}$). Attempts to effect the total synthesis of an 18-oxygenated steroid such as 18-aldehydoprogesterone (V) from this adduct were initiated by ozonization of its acetate (IV: $R^1 = \text{-Ac}$, $R^2 = \alpha\text{-CH}_2\text{CH}(\text{Me})\text{CN}$), decomposition of the ozonide with hydrogen peroxide, and vigorous basic hydrolysis to the triacid (VI: $R^1 = \alpha\text{-OH}$, $R^2 = R^3 = R^4 = \text{-CO}_2\text{H}$) in 92% overall yield. Diazomethane esterification and mild hydrolysis of the crude triester (VI: $R^1 = \alpha\text{-OH}$, $R^2 = R^3 = R^4 = \text{-CO}_2\text{Me}$) with excess base afforded a 96% yield of the diacid (VI: $R^1 = \alpha\text{-OH}$, $R^2 = \text{-CO}_2\text{Me}$, $R^3 = R^4 = \text{-CO}_2\text{H}$) which was quantitatively converted into its acetate (VI: $R^1 = \alpha\text{-OAc}$, $R^2 = \text{-CO}_2\text{Me}$, $R^3 = R^4 = \text{-CO}_2\text{H}$) with glacial acetic acid and anhydrous hydrogen chloride. The action of oxalyl chloride on the sodium salt of this acetate gave the corresponding diacid chloride which on condensation with dibenzyl malonate, followed by hydrogenolysis and decarboxylation gave 70-81% of the diketone (VI: $R^1 = \alpha\text{-OAc}$, $R^2 = \text{-CO}_2\text{Me}$, $R^3 = R^4 = \text{-COMe}$) separable into two interconvertible isomers A and B, epimeric at the carbon atom α to the original cyano group. The epimeric triacetates A and B (VI: $R^1 = \alpha\text{-OAc}$, $R^2 = \text{-CO}_2\text{Me}$, $R^3 = R^4 = \text{-OAc}$) were obtained from the diketones in 69 and 65% yields by rearrangement with peroxytrifluoroacetic acid. Mild basic hydrolysis of these triacetates afforded 87 and 85% yields of the respective lacto diols (VII: $R^1 = \alpha\text{-OH}$, $R^2 = >\text{C=O}$, $R^3 = H$, $R^4 = \text{-OH}$). Oxidation with chromium trioxide in pyridine followed by treatment with ethylene glycol afforded a 58% yield of the lacto ketals (VII: $R^1 = R^4 = \text{-OCH}_2\text{CH}_2\text{O-}$, $R^2 = >\text{CO}$, $R^3 = H$) in both series. Reduction with lithium aluminum hydride produced the ketal diols A and B (VI: $R^1 = R^4 = \text{-OCH}_2\text{CH}_2\text{O-}$, $R^2 = \text{-CH}_2\text{OH}$, $R^3 = \text{-OH}$) in 80 and 93% yields. The lactol acetate (VII: $R^1 = R^4 = \text{-OCH}_2\text{CH}_2\text{O-}$, $R^2 = \text{-CH}_2\text{-}$, $R^3 = \text{-OAc}$) was obtained after oxidation of diol B with N-bromo acetamide and acetylation. Preliminary attempts to hydrolyze and cyclize this lactol acetate were unsuccessful.

In preliminary investigations, the Michael adduct (I), by procedures similar to those applied in the tetracyclic series led to lactone VIII. Degradative procedures involving the action of bromine on the silver salt (II: $R^1 = \text{-CO}_2\text{Me}$, $R^2 = R^3 = \text{-CO}_2\text{Ag}$) or ozonization of enolic derivatives of the dialdehyde (II: $R^1 = \text{-CO}_2\text{Me}$, $R^2 = R^3 = \text{-CHO}$) were not promising.

PART II

The Michael reaction between 2-methyl-2-cyclohexenone and 1-decalone had been shown to give the adduct IX (Warnhoff, Ph.D. Thesis, University of Wisconsin (1953)).



In an attempt to apply this reaction to a steroid synthesis, the monoketal ⁹X: $R = \text{-OCH}_2\text{CH}_2\text{O-}$, $5\beta\text{H}$) was prepared from the unsaturated ketone (X: $R = \text{=O}$, $\Delta^{4,5} >\text{C=C}<$) (See N. L. Wendler, H. L. Slates, and M. Tishler, J. Am. Chem. Soc., 73, 3816 (1951)) by catalytic reduction, followed by selective reaction with ethylene glycol. Attempts to employ this monoketal in the Michael reaction with 2-methyl-2-cyclohexenone, alone or with a blocking group, were unpromising. Preliminary experiments on formation of ring C of the furfurylidene derivative of adduct IX by treatment with ethyl α,β -dichloropropionate and ethyl α -chloroacrylate gave complex mixtures from which the crystalline chloro hydrin XI was isolated.

164 pages. \$2.15. Mic 57-2670

THE DEGRADATION OF CERTAIN CARBOHYDRATES BY PERIODIC ACID

(Publication No. 21,922)

Clifford James McGinn, Ph.D.
Syracuse University, 1957

Simple carbohydrates were allowed to react with periodic acid in aqueous medium at room temperature. Titration of the reaction mixture with standard thiosulfate solution showed the reaction to be very fast. When the ratio of carbohydrate to periodic acid was held at eight to one the oxidation was complete within five minutes.

The formic acid produced in the reaction, when titrated directly with standard base, gave low yields. This was found to be due to partial ester formation, a fact previously reported in the literature. The reaction mixture was allowed to stand with an excess of standard base. Back titration with standard acid showed the

amount of formic acid to be quantitative with respect to periodic acid.

A rotational study made on the reaction mixtures gave specific rotations which correspond to carbohydrates that would result from a single step degradation.

By combining the quantitative yields of formic acid with the results of the rotational studies, it has been shown that in the reaction between simple carbohydrates and periodic acid there is a preferential cleavage between the hemiacetal group and the adjacent carbinol. When the ratio of carbohydrate to periodic acid was eight to one, the degradation to the next lower carbohydrate was quantitative.

The above results were further substantiated by the isolation of β -D-arabinose tetraacetate from the acetylated products of the reaction between glucose and periodic acid. It was separated by differential sublimation.

75 pages. \$2.00. Mic 57-2671

STUDIES TOWARD THE SYNTHESIS OF STRYCHNOS ALKALOIDS

(Publication No. 21,812)

Albert Peter Paul, Ph.D.
Columbia University, 1955

In this investigation 9-carboxy-1,2,3,4,4a,10a-hexahydrobenzo[b]pyrrocolin-6(10H)-one (I) was synthesized as a possible progenitor of an α -pyridone derivative of benzo[b]pyrrocoline. The latter structure forms the I, II, III-ring system of dehydrostrychninolone, a degradation product of strychnine.

Dehydrogenation of ethyl 1,4,5,6-tetrahydro-2-methyl-6-oxonicotinate (II) over palladium gave ethyl 2-methyl-6-oxynicotinate (III). By means of phosphorous oxychloride III was converted to ethyl 2-methyl-6-chloronicotinate (IV), which, in turn yielded ethyl 2-bromomethyl-6-chloronicotinate (V) by the action of N-bromosuccinimide. Alkylation of the sodio derivative of 2-carbethoxycyclohexanone with V gave ethyl 2-(1'-carbethoxy-2'-oxocyclohexyl)methyl-6-chloronicotinate (VI), and mild alkaline hydrolysis of VI led to 2-(2'-oxocyclohexyl)-methyl-6-chloronicotinic acid (VII). Subsequent treatment of VII with concentrated alkali gave 9-carboxy-4a-hydroxy-1,2,3,4,4a,10a-hexahydrobenzo[b]pyrrocolin-6(10H)-one (VIII), which is the ring tautomer of the corresponding open-chain compound, 2-(2'-oxocyclohexyl)methyl-6-oxynicotinic acid (IX). Concentrated sulfuric acid was employed to eliminate the tertiary hydroxyl group of VIII and afforded a mixture of 9-carboxy-1,2,3,4-tetrahydro-benzo[b]pyrrocolin-6(10H)-one (X) and 9-carboxy-1,2,3,4-tetrahydro-benzo[b]pyrrocolin-6(4aH)-one (XI). A mixture of X and XI was hydrogenated over palladized charcoal to give I.

During the course of this investigation an interesting and deep-seated rearrangement of the 6-chloronicotinic acid derivative VII was brought about by the action of concentrated phosphoric acid leading to 6-(4'-carboxy)butyl-2-hydroxy-5-oxo-6,7-dihydro-1,5H-pyridine (XII). The structure of the product resulting from this example of an acid-catalyzed Claisen-type of condensation was proved by the following unequivocal synthesis: alkylation of the sodio derivative of diethyl malonate with V gave ethyl 2-(2',2'-dicarbethoxy)ethyl-6-chloronicotinate (XIII); XIII on

treatment with sodium hydride cyclized with concomitant loss of a carbethoxyl group to form 6-carbethoxy-2-chloro-5-oxo-6,7-dihydro-1,5H-pyridine (XIV); and alkylation with ethyl 5-iodovalerate converted XIV to 6-carbethoxy-6-(4'-carbethoxy)butyl-2-chloro-5-oxo-6,7-dihydro-1,5H-pyridine (XV), which on acid hydrolysis gave the previously obtained XII. A reasonable mechanism for the rearrangement is suggested, and the preparation of several 1,5H-pyridine derivatives is described. Included among the latter are methods developed for the selective hydrogenation of one or of the two endocyclic double bonds of α -pyridone derivatives of 1,5H-pyridines.

The infrared and ultraviolet spectral properties of the benzo[b]pyrrocoline, pyridine, and nicotinic acid derivatives were studied and recorded. Contrary to previously reported results, it was found here that the ultraviolet absorption spectra of α -pyridones show noticeable differences in neutral and alkaline media. These differences are even more magnified when the α -pyridone nucleus carries an electron-withdrawing group in the 5-position.

Both the ultraviolet and infrared absorption spectra of the α -pyridone and 2-hydroxy-1,5H-pyridine derivatives studied here gave evidence of only the lactam structure. In the infrared, the unalkylated α -pyridones and the unalkylated 2-hydroxy-1,5H-pyridines gave a broad band in the 3.0-4.0 μ region, while the N-alkylated derivatives showed a narrow band in the same region. But each of the structures (alkylated and unalkylated) gave a characteristic strong band at about 6.05 μ .

With respect to the ferric chloride color reaction, the α -pyridones and 2-hydroxyl-1,5H-pyridines gave a characteristic color-orange to red-denoting their weak phenolic character. However, no color was observed when the 5-position was substituted with an electron-withdrawing group.

134 pages. \$2.00. Mic 57-2672

THE SWAMPING CATALYST EFFECT IN BROMINATION OF AROMATIC CARBONYL COMPOUNDS

(Publication No. 22,020)

Hughlan William Pope, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor D. E. Pearson

A 60% yield of *m*-bromoacetophenone, uncontaminated with phenacyl bromide, was obtained by the bromination of acetophenone mixed with a large excess of aluminum chloride. With catalytic quantities of aluminum chloride the bromination of acetophenone yields phenacyl bromide apparently unaccompanied by nuclear substitution products. This rather dramatic change in the orientation of the bromine atom was entitled "the swamping catalyst effect."

Further investigation revealed that the minimum quantity of aluminum chloride which could be used in a swamping catalyst bromination was 1.2 moles of aluminum chloride for each mole of acetophenone undergoing bromination. Larger molar ratios of aluminum chloride to acetophenone also gave the swamping catalyst effect but at an accelerated rate. External heating of the reaction

mixture during a swamping catalyst bromination was found to greatly increase the rate of reaction.

The same swamping catalyst effect was observed in the bromination of *p*-methylacetophenone, *m*-methylacetophenone, propiophenone, *p*-*t*-butylacetophenone, *p*-bromoacetophenone, benzaldehyde and *p*-methylbenzaldehyde as was observed for acetophenone. In each of these cases nuclear bromination was obtained in the meta position to the carbonyl group. The yields of products ranged from 50-70%. Nuclear dibromination was also obtained with both acetophenone and *p*-methylacetophenone.

Thus a general method of direct nuclear bromination of aromatic aldehydes and ketones was developed. This method was found to be a superior method for the preparation of brominated carbonyl compounds in that it is more direct and convenient to use and affords considerable increases in percentage yields of products over those obtained by classical methods.

The swamping catalyst effect was ascribed to (a) suppression of "active methylene" activity by complex formation between the carbonyl group and aluminum chloride and (b) the increase in substitution activity of bromine as it exists in complex formation with aluminum chloride.

The following bromination of acetophenone is presented as a typical example of this new method of direct nuclear bromination: acetophenone (0.28 mole) was added dropwise to anhydrous aluminum chloride (0.84 mole) contained in a flask equipped with a stirrer, gas outlet, and drying tubes. Bromine (0.28 mole) then was added to the fluid mass at room temperature within 10 minutes. After being stirred an additional hour and becoming semi-solid, the mixture was quenched in a slurry of ice and acid. After the usual extraction, washing, and drying of the oil in ether, the oil was concentrated and stripped from the residue (5.6g) by distillation at 2 mm. pressure; yield, 42.7 g. Fractionation of the distillate at 2 mm. yielded crude acetophenone (b.p. 57-94°, 3.4 g., 10%) and *m*-bromoacetophenone (b.p. 94-95°, n_D^{25} 1.5740; m.p. and reported m.p. 7-8°; 33.1 g. 59.4%; oxime m.p. and mixture m.p. with an authentic sample 100-101°).

101 pages. \$2.00. Mic 57-2673

THE QUESTION OF REARRANGEMENTS IN THE ACETOLYSIS OF SECONDARY ALKYL DERIVATIVES (SECTIONS I-IX)

(Publication No. 21,310)

Benjamin Charles Repka, Jr., Ph.D.
Purdue University, 1957

Major Professor: Herbert C. Brown

The acetolysis reactions (S_N1-E1) of 2-pentyl *p*-toluenesulfonate, 2-pentyl *p*-bromobenzenesulfonate, 2-pentyl benzenesulfonate, 2-pentyl bromide and 2-pentyl iodide have been studied to ascertain the extent of rearrangement occurring in the reactions via 1,2-hydride shifts in the carbonium ion intermediate. Utilizing standard methods of infrared analysis, the reactions proceeded in all cases without rearrangement provided sufficient potassium acetate was present to neutralize the sulfonic acid liberated in the reaction. In the absence of potassium acetate

rearrangements to the extent of 10-12% were noted. Negligible rearrangements in other cases (<0.8%) may be attributed to impurities in the reaction products affecting slightly the infrared analyses. The presence of potassium *p*-toluenesulfonate in large excess in the reaction media has had no perceptible effect on the extent of rearrangement or on the olefin yield and composition. Olefin yields (ca. 40%) and compositions (1-pentene, 14%; cis-2-pentene, 34%; trans-2-pentene, 52%) from the 2-pentyl sulfonate esters were sensibly constant. Slight shifts in these values for 2-pentyl bromide and 2-pentyl iodide may be attributed to the operation of other mechanisms (S_N2-E2) than the unimolecular.

In marked contrast to these results the acetolyses of 2-deutero-2-butyl *p*-toluenesulfonate in the presence of equivalent potassium acetate and a large excess of potassium *p*-toluenesulfonate gave 4-5% of the rearranged product, 3-deutero-2-butyl acetate, utilizing the differential infrared method in the analysis of the reaction product. Mass spectrograph studies indicate the rearrangement as slightly higher, 6-9%. These results may indicate an inherent difference in the 2-butyl and 2-pentyl systems, facilitating rearrangement in the former and/or preventing it in the latter. An isotope effect has been observed in the first order rate constant in the acetolysis of 2-deutero-2-butyl *p*-toluenesulfonate. The rate constants (k_1) at 70° are: 2-butyl *p*-toluenesulfonate, $(0.380 \pm 0.006) \times 10^{-4}$ sec.⁻¹; and 2-deutero-2-butyl *p*-toluenesulfonate, $(0.330 \pm 0.005) \times 10^{-4}$ sec.⁻¹.

The acetolysis of 3-pentyl *p*-toluenesulfonate resulted in approximately 5% rearrangement by 1,2-hydride shifts in the carbonium ion intermediate. 4,4-Dimethyl-2-pentyl *p*-toluenesulfonate gave no rearrangement on acetolysis and 2,2-dimethyl-3-pentyl *p*-toluenesulfonate resulted in extensive rearrangement (ca. 85%) by a 1,2-methyl group shift in the carbonium ion intermediate. In these latter cases, the olefin represented the largest portion of the product.

Rate data has been determined for the acetolysis of a series of secondary alkyl *p*-toluenesulfonates at 70°. A marked increase in rate with 2,2-dimethyl-3-pentyl *p*-toluenesulfonate (five times the rate observed with pinacolyl *p*-toluenesulfonate) may be ascribed to B-strain (steric assistance).

274 pages. \$3.55. Mic 57-2674

CONFORMATIONAL EFFECTS IN SOME 1-KETO-HYDROPHENANTHRENES

(Publication No. 21,617)

William H. Reusch, Ph.D.
Columbia University, 1957

The nature of the ring junction equilibrium in the 7-substituted-1-keto-12-methyl-1,2,3,4,9,10,11,12-octahydrophenanthrenes (I) was investigated, since previous reports indicated that the 7-isopropyl-ketone (Ib) might be predominantly cis fused at equilibrium. The usefulness of these compounds as synthetic intermediates depends upon this factor.

Unambiguous evidence concerning this ring junction was obtained from the corresponding 7-methoxy-ketone (Ic) in the following manner. Birch reduction of Ic gave

1-hydroxy-12-methyl-7-keto-1,2,3,4,5,6,7,9,10,11,12,13-dodecahydrophenanthrene (II) which upon mild oxidation resulted in 1,7-di-keto-12-methyl-1,2,3,4,5,6,7,9,10,11,12,13-dodecahydrophenanthrene (III) in 50% yield. This material was not stable to acid or base, but was converted to an isomeric dione IV. A similar reaction sequence involving 1-keto-12-methyl-1,2,3,4,9,10,11,12-octahydrophenanthrene (Ia) gave IV in 15% yield. The most reasonable explanation of these results is that III represents *cis* fused material and IV is the corresponding *trans* fused isomer. Since it is not likely that the nature of the substituent (R) will affect the ring junction equilibrium in I either sterically or electrically, a lower limit of 50% *cis* and 15% *trans* can be assigned to the equilibrium composition of these ketones. This is in agreement with the rough predictions obtained from a conformational analysis treatment of structure I.

A synthetic approach to abietic acid was investigated but our work makes it rather unlikely that intermediates derived from Ic will be of much use in the synthesis of resin acids although we were able to effect the transformation into the resin acid type of the model substance cholestan-4-one (XVIII). A new and superior synthesis of XVIII was developed during the course of this latter work.

80 pages. \$2.00. Mic 57-2675

THE SYNTHESIS OF 9-HYDROXY-2-AZABICYCLO(3.3.1)NONANE AND THE STEREOCHEMISTRY OF SOME POLYSUBSTITUTED CYCLOHEXANES

(Publication No. 21,822)

John Winthrop Sargent, Ph.D.
Columbia University, 1955

In this investigation the stereoisomeric 3-amino-2-hydroxycyclohexaneacetic acids (nomenclature: I, $\text{CH}_2\text{CO}_2\text{R}/\text{OH}$ *trans*, $\text{CH}_2\text{CO}_2\text{R}/\text{NH}_2$ *cis*; II, $\text{CH}_2\text{CO}_2\text{R}/\text{OH}$ *cis*, $\text{CH}_2\text{CO}_2\text{R}/\text{NH}_2$ *cis*) were studied and their behavior compared with that of the stereoisomeric 2-hydroxycyclohexaneacetic acids, the 3-aminocyclohexaneacetic acids, and the 2-aminocyclohexanols. A stereoselective synthesis of 9-hydroxy-2-azabicyclo(3.3.1)nonane (III, OH/NH on opposite sides of the bicyclic system) developed from this work. The configurations of the 3-carboxycyclohexaneacetic acids (IV, *cis*; V, *trans*) were also determined.

Catalytic hydrogenation of *cis* ethyl 3-benzamide-2-oxocyclohexaneacetate (VI), in ethanol solution, followed by hydrolysis gave *trans-cis* 3-benzamido-2-hydroxycyclohexaneacetic acid (VII, stereochemistry corresponding to I). VI was obtained from *cis* ethyl 3-amino-2-oxocyclohexaneacetate hydrochloride (VIII), which was in turn reduced with sodium borohydride to *trans-cis* ethyl 3-amino-2-hydroxycyclohexaneacetate (IX). IX gave VII on treatment with benzoylchloride in alkali. An aqueous solution of VIII was catalytically hydrogenated to *cis-cis* ethyl 3-amino-2-hydroxycyclohexaneacetate hydrochloride (X, stereochemistry corresponding to II). X was hydrolyzed in acid medium to *cis-cis* 3-amino-2-hydroxycyclohexaneacetic acid hydrochloride (XI), which could in turn be obtained directly from catalytic hydrogenation of an aqueous solution of VIII containing mineral acid. From XI, *cis-cis* 3-benzamido-2-

hydroxycyclohexaneacetic acid (XII) was obtained which must differ from VII only in the configuration of the C_2 hydroxyl group.

From X *cis-cis* ethyl 3-amino-2-hydroxycyclohexaneacetate (XIII) was obtained with one equivalent of alkali and *cis-cis* 3-amino-2-hydroxycyclohexaneacetate acetate (XIV) was formed by exchange of chloride by acetate.

Pyrolysis of IX at 160° gave anti 9-hydroxy-3-oxo-2-azabicyclo(3.3.1)nonane (XV), which on reduction with lithium aluminumhydride gave the hydroxymorphan (III). III failed to give an oxazolidine derivative with carbonyl reagents. The amino alcohol ester of the *cis-cis* series, i.e. XIII failed to form a lactam under similar conditions, a result which is interpreted as due to steric interference of an equatorial hydroxyl in the cyclization. Pyrolysis of the acetate salt XIV, or of *cis-cis* 3-amino-2-hydroxycyclohexaneacetic acid (XVI, obtained from XI) yielded the same hydroxy lactam, XV, obtained from IX. Thus, an epimerization to the more stable bicyclic system III took place during cyclization of the compounds of *cis-cis* series.

The stereochemistry of these compounds was based on: 1) the known course of catalytic hydrogenation of cyclohexanone derivatives in neutral and acid media; 2) the course of reduction of cyclohexanone derivatives with complex metal hydrides; 3) the action of hydrogen chloride, in dioxane solution, on the N-benzoyl hydroxy acids, VII and XII; 4) the action of nitrous acid on the amino alcohol esters IX and X; and 5) the cyclization of IX, XIV, and XVI to the hydroxy lactam XV.

The synthesis of VIII from 2-carbethoxycyclohexanone (XVI) proceeded through the following steps. Alkylation of XVI to ethyl 1-carbethoxy-2-oxocyclohexaneacetate (XVII); sodium ethoxide-catalyzed rearrangement of XVII to ethyl 3-carbethoxy-2-oxocyclohexaneacetate (XVIII); potassium hydroxide hydrolysis of XVIII to 3-carbethoxy-2-oxocyclohexaneacetic acid (XIX); nitrosation of XIX to 3-oximino-2-oxocyclohexaneacetic acid (XX); and stereoselective catalytic hydrogenation, in ethanolic hydrogen chloride, of XX to VIII.

Starting from the *cis*- and *trans* 3-carboxycyclohexane-carboxylic acids (XXI and XXII, respectively), and proceeding via stereoselective reactions the *cis* and *trans* 3-carboxycyclohexaneacetic acids (IV and V, respectively) were prepared. The 3-carboxycyclohexaneacetic acid, previously obtained as the product of catalytic hydrogenation of isomorphthalic acid and regarded as the *trans* isomer, was shown to be *cis* 3-carboxycyclohexaneacetic acid.

126 pages. \$2.00. Mic 57-2676

A STUDY OF THE RATES OF REARRANGEMENT OF THE *meta*- AND *para*-HALOACETOPHENONE OXIMES

(Publication No. 22,023)

Harold Franklin Smith, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor D. E. Pearson

The rates of rearrangement of the four *meta*- and the four *para*-halogen-acetophenone oximes were determined

in 95.7% H_2SO_4 for the primary purpose of studying the influences of halogen atoms on reaction rates.

A precise convenient method for following the rates of rearrangement of ketoximes of the mixed alkyl-aryl type in concentrated H_2SO_4 was developed. The method involves periodically removing exactly determined quantities of the reaction solution from the reaction flask, and quenching them in predetermined volumes of water at 0°C .

The aliquot samples (ca. 10 for each run) were hydrolyzed in sealed, screw-top bottles at $50\text{--}60^\circ\text{C}$ for a minimum of thirty hours.

After hydrolysis, an exactly determined quantity of isooctane (Phillips' 99 mole % pure) is added to each sample bottle of hydrolysis solution to effect selective extraction of the ketone formed from hydrolysis of the unrearranged oxime. The other products of rearrangement remain in the 8% $\text{H}_2\text{SO}_4\text{--H}_2\text{O}$ phase. The two phases remain in contact for a minimum of twelve hours.

After the extraction step, the isooctane layer is analyzed for carbonyl optical density in the ultraviolet region using a Beckman DU Spectrophotometer at a wavelength setting of maximum absorption of the compound being studied.

A plot of $\log \text{O.D.}^*$ versus time is then made, and the correct slope of the curve determined by the method of "least squares". From the slope of the curve of O.D. versus time, the reaction rate constants (k), the half-life ($T_{1/2}$) of the reaction, and the σ_p value of the substituent group on the aromatic ring is calculated. The method is precise to $\pm 2\%$, or better.

In this investigation, nine oximes were studied by the above described method. Acetophenone oxime was rearranged at only $51.28 \pm 0.01^\circ\text{C}$, whereas, the four *para*- and the four *meta*-halogen-acetophenone oximes were rearranged at $41.28 \pm 0.01^\circ\text{C}$, $51.28 \pm 0.01^\circ\text{C}$, and $61.28 \pm 0.01^\circ\text{C}$. The concentration of oxime in 95.7% H_2SO_4 was 10^{-4} mole liter, giving a mole ratio 1:10000 which approaches ideality for the pseudo-first-order kinetic treatment.

From the rate constants calculated by the "method of least squares," the E of activation, S of activation, and half-lives ($T_{1/2}$) of each compound were determined, as well as, the σ_p values of the substituents on the aromatic ring. These data are presented in the following table.

Table I

Compound	$k \times 10^{-3} \text{ min.}^{-1} (51.28^\circ\text{C})$	e	$E(\text{K.cal.})$
-Acetophenone	1.47 ± 0.02		
p-F	1.13 ± 0.01	+0.059	22
p-Cl	0.952 ± 0.02	+0.097	21
p-Br	0.889 ± 0.004	+0.112	24
p-I	1.16 ± 0.01	+0.053	26
m-F	0.441 ± 0.001	+0.270	23
m-Cl	0.487 ± 0.010	+0.247	24
m-Br	0.571 ± 0.003	+0.213	18
m-I	0.727 ± 0.015	+0.157	23

These data indicate the order of electron-withdrawal to be: $m\text{-F} > m\text{-Cl} > m\text{-Br} > m\text{-I} > p\text{-Br} > p\text{-Cl} > p\text{-F} > p\text{-I} > \text{H}$. The inductive order is observed in the *meta*-series;

however, the magnitude of the σ_p values for these groups indicates a strong inductomeric contribution by the *meta*-halogens.

A "scrambled" order is observed in the *para*-series resulting from the interaction of three, and possibly four modes of electron distribution which may be utilized by halogen atoms *para* to the position of electrophilic attack on an aromatic ring. These modes of distribution are resonance, induction, electromerism, and possibly inductomerism.

The ultraviolet spectra of the oximes were obtained in isooctane and in 94.5% H_2SO_4 . A strong bathochromic was observed in the spectra taken in H_2SO_4 as compared to the spectra taken in isooctane.

The infrared spectra of each *meta*- and *para*-halogen-acetophenone oxime were determined by means of a Perkin-Elmer Model 21 Spectrophotometer using the KBr "pellet-ing" technique for preparing samples.

212 pages. \$2.75. Mic 57-2677

*Optical density.

STUDIES ON THE SYNTHESIS AND STEREOCHEMISTRY OF THE 16 KETO ISOMERS OF ESTRONE

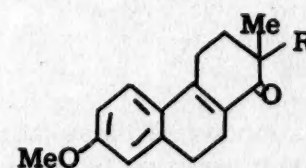
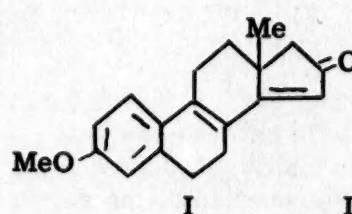
(Publication No. 21,867)

Donald Wesley Stoutamire, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Alfred L. Wilds

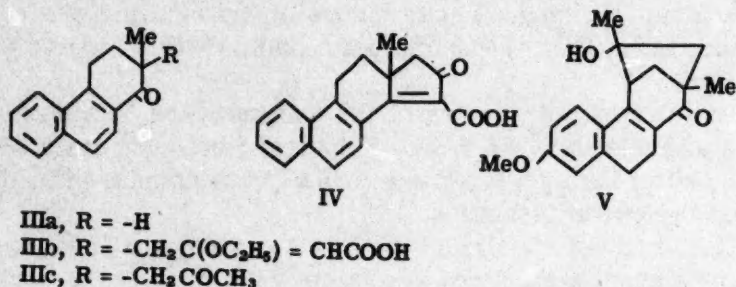
Previous investigations (A. L. Wilds and T. L. Johnson, J. Am. Chem. Soc., 70, 1166 (1948); Robert Doban, Ph.D. Thesis, University of Wisconsin, 1952) have given two stereoisomers of the 16-keto isomers of estrone methyl ether designated A and B to which the *cis-syn-cis* and *trans-syn-cis* configurations were tentatively assigned. In continuing these studies, it was considered desirable to develop a better synthesis of the unsaturated ketone I.

In order to overcome the failure previously encountered in the attempt to convert the substituted acetic acid IIb to the diketone IIc through the acid chloride-malonic ester route, a modified ring D synthesis was developed in which the entire acetone side chain was introduced indirectly.



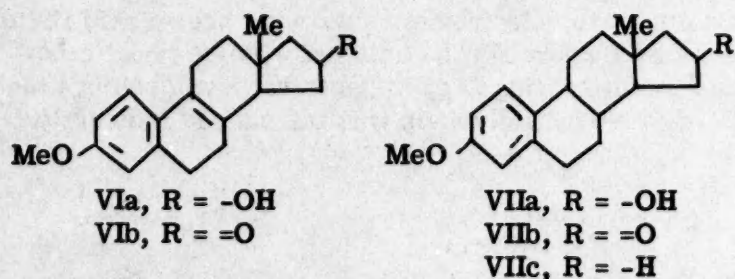
Addition of ethyl β -ethoxy- γ -bromocrotonate, prepared by the reaction of N-bromosuccinimide with ethyl β -ethoxycrotonate, to the sodium enolate of the ketone IIIa, prepared with ethereal sodium triphenylmethyl, gave after basic hydrolysis small amounts of the tetracyclic acid IV plus

24-38% of the substituted crotonic acid **IIIb** which could be decarboxylated in dilute acetic acid in nearly quantitative yields to the known diketone **IIc**. The structure of the acid **IV** was shown by selective hydrolysis of the methyl ester of the acid **IIIb** to the β -keto ester followed by cyclization with piperidine acetate.



On applying these reactions to the hexahydro ketone **IIa**, addition of the bromo ester followed by hydrolysis gave about 28% of the acid **IId**. Additional material could be isolated as the diketone **IIc**. Vigorous acid hydrolysis of the substituted crotonic acid **IId** gave a molecular compound consisting of the diketone **IIc** and the ketol **V**. This same molecular compound was obtained by short basic treatment of the diketone. Mild acid hydrolysis of **IId** in 50% acetic acid gave the diketone **IIc** in quantitative yield. Cyclization of the diketone **IIc** in sodium methoxide gave the tetracyclic ketone **I** in 95% yield. Catalytic reduction of this ketone over 30% palladium-carbon catalyst gave a third isomer of **VIIb** designated **C** and assigned the cis-syn-trans configuration.

Reduction of the unsaturated ketone **I** with sodium borohydride followed by saturation of the C₁₄ double bond over neutral palladium-carbon gave a crude mixture containing the alcohol **VIa** which could be oxidized by the Oppenauer method to the trans ketone **VIIb** in over-all 16% yield. Reduction of this ketone with sodium borohydride followed by a Birch reduction using sodium in liquid ammonia, or a similar Birch reduction on the crude alcohol **VIa**, gave the crude saturated alcohol **VIIa** as an oil which on Oppenauer oxidation gave a fourth isomer of **VIIb** designated **D** and assigned the trans-anti-trans configuration.



A comparison of these isomers with estrone and authentic 14-isoestrone (W. S. Johnson and W. F. Johns, to be published) through the Huang-Minlon reduction to the respective methoxy hydrocarbons of structure **VIIc** has confirmed the assignment of the trans-anti-trans and trans-syn-cis configurations to the **D** and **B** isomers, respectively. A similar comparison of isomers **A** and **C** to the ϵ^1 and ϵ^2 estrones (Israel David, Ph. D. Thesis, University of Wisconsin, 1954) to which the cis-syn-cis and cis-syn-trans structures have been assigned has confirmed the respective correspondence of configurations. It has been shown that the ϵ estrones have a B/C cis ring juncture and that they

differ in configuration only at C₁₃. In addition it has been shown that the 16-keto isomer **A** must have the C₉ hydrogen cis with respect to the angular methyl. These relationships reasonably establish the configurations of the isomers **A** and **C** as those given, the only question being the possibility that the configuration at C₁₄ be reversed. However, the evidence as a whole seems overwhelmingly in favor of the configurations as assigned.

192 pages. \$2.50. Mic 57-2678

THE STEREOCHEMICAL RELATIONSHIP OF (+)-3-N-METHYLAMINOCYCLOPENTENE TO (+)-CYCLOPENTEN-3-OL

(Publication No. 21,832)

Howard Alton Vaughn, Jr., Ph.D.
 Columbia University, 1955

The configurations of optically active compounds relative to one another is information which, for various reasons, researchers have sought for many years. Since the absolute configuration of no compound was known, until recently, (+)-glyceraldehyde was arbitrarily assigned the D-configuration and chosen as the standard reference compound to which all others might ultimately be related.

Relationships which depend on chemical interconversions are, in general, unequivocal when the chemical changes are remote from the asymmetric center. An example of this is the conversion of (-)-serine to (+)-alanine. When the methyl ester hydrochloride of (-)-serine is treated with phosphorus pentachloride its hydroxyl group is replaced by chlorine. After hydrolysis of the ester group the chlorine can be reductively replaced by hydrogen to yield (+)-alanine. Interconversions such as this, however, are useful only for relating compounds of the same class. By this and similar methods the other naturally occurring amino acids and many secondary carbinyl amines have been related to (+)-alanine. Likewise, the sugars, hydroxy acids, and secondary carbinols have been related to D-(+)-glyceraldehyde.

Determining configurational relationships between compounds having different functional groups at the asymmetric center poses a more difficult problem. The conversion of one to the other is an acceptable method only if the reaction involved has been proven conclusively to be stereospecific and it is known whether the specificity involves retention or inversion of configuration. The Curtius and related rearrangements satisfy these conditions and have been used to relate amines to carboxylic acids.

A second method for relating compounds having different functional groups involves the direct displacement of one substituent by another in an S_N2 reaction. In this method it is necessary to assume that a series of nucleophilic agents will displace a particular substituent in the same mechanistic fashion and with identical steric results. By this method it recently has been demonstrated that (+)-alanine has the L-configuration (+)- α -bromopropionic acid with hydroxide ion under kinetically controlled S_N2 conditions yielded L-(+)-lactic acid. With sodium azide it yielded an α -azidopropionic acid which was catalytically reduced to (+)-alanine.

The degradation of N-acetyl-D-glucosamine to

(-)-N-acetylalanine confirmed the assignment of the L-configuration to (+)-alanine. However, it still remained desirable to confirm the relationship between amines and carbinols by a chemical method which would not involve reactions at the center of asymmetry.

Such a relationship has been accomplished in this work. An amine, (+)-3-N-methylaminocyclopentene, has been related to a carbinol, (+)-cyclopenten-3-ol, by a series of reactions, none of which jeopardizes the integrity of the asymmetric centers under consideration.

Cyclopentanone-3-carboxylic acid was resolved by fractional crystallization of its brucine salt. Upon esterification and catalytic hydrogenation a mixture of the diastereomeric 3-carbethoxycyclopentanol was obtained. When this mixture was treated first with hydrazine hydrate and then with nitrous acid the Curtius rearrangement of the *cis*-isomer yielded (-)-2-oxa-4-azabicyclo-[3.2.1]-octanone-3. This urethane was reduced by lithium aluminum hydride to (-)-*cis*-3-N-methylaminocyclopentanol. When exhaustively methylated and subjected to the action of strong alkali the aminoalcohol yielded (-)-cyclopenten-3-ol. Dehydration of the amino-alcohol yielded (+)-3-N-methylaminocyclopentene. Because of the *cis* orientation of the functional groups in their precursor these two compounds are mirror images in configuration. Authentic samples of both the amine and carbinol have been prepared from 3-chlorocyclopentene and they have been demonstrated to be resolvable, confirming the allylic position of the double bond. Further, these two compounds provide convenient starting materials for the prosecution of the long range problem of confirming the configuration of (+)-alanine relative to D-(+)-glyceraldehyde.

80 pages. \$2.00. Mic 57-2679

CHEMISTRY, PHYSICAL

STUDIES OF THE EXCHANGE REACTION BETWEEN CHROMIUM(III) AND CHROMIUM(VI)

(Publication No. 21,842)

Carl Altman, Ph.D.
The University of Wisconsin, 1957

Supervisor: Associate Professor Edward L. King

The exchange reaction between chromium(III) and chromium(VI) in aqueous perchloric acid solution has been studied at 95° over a wide range of chromium(III), chromium(VI), and hydrogen ion concentrations. Evidence has been found for the existence of two types of solutions in this system. These two types of solutions differ with respect to the concentrations of the species of intermediate oxidation state of chromium(IV) and chromium(V), compared to the equilibrium concentrations of these same species. On the basis of both the exchange data and the results of other studies, the reaction



is believed to come to equilibrium relatively rapidly. As a result of this reaction alone, the concentration of

chromium(IV) is equal to the concentration of chromium(V) and both are proportional to $[\text{Cr(III)}]^{1/2} \times [\text{Cr(VI)}]^{1/2}$. Except for unlikely coincidence, such a solution (with $[\text{Cr(IV)}] = [\text{Cr(V)}]$) is not at equilibrium; at equilibrium, $[\text{Cr(IV)}] \propto [\text{Cr(III)}]^{2/3} \times [\text{Cr(VI)}]^{1/3}$ and $[\text{Cr(V)}] \propto [\text{Cr(III)}]^{1/3} [\text{Cr(VI)}]^{2/3}$.

The rate law for the exchange reaction for nonequilibrium solutions at an ionic strength of 0.90, has been determined as $10^3 \times R_0 = [72.6(\text{H}^+)^{1/2} + 2.74/(\text{H}^+)^{3/2}] [\text{Cr(III)}]^{3/2} [\text{Cr(VI)}]^{1/2} [(\text{H}^+ + K_1)^{-1/2}]$ moles/liter-hour; this equation involves the total concentration of each of the chromium oxidation states, the actual concentration of hydrogen ion, and K_1 , the first dissociation constant of chromic acid. In equilibrium solutions at an ionic strength of 0.90, the rate law is:

$$10^3 \times R_0 = [9.46/(\text{H}^+)^{1/3} + 0.358/(\text{H}^+)^{7/3}] \times [\text{Cr(III)}]^{4/3} [\text{Cr(VI)}]^{2/3} [(\text{H}^+ + K_1)^{2/3}]$$

moles/liter-hour

These results are interpreted in terms of there being two pathways for exchange; both involve transition states with one chromium(III) and one chromium(V) and differ by two hydrogens (i.e. the transition states are $(\text{H}_3\text{CrO}_4 \cdot \text{Cr}^{+3})^\ddagger$ and $(\text{HCrO}_4 \cdot \text{Cr}^{+3})^\ddagger$).

177 pages. \$2.35. Mic 57-2680

STUDIES OF THE FORMATION AND SEPARATION OF CERTAIN COMPLEX IONS OF COPPER, COBALT, AND NICKEL

(Publication No. 22,029)

Walter Dayton Bond, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor M. D. Peterson

PART I. A STUDY OF THE COMPLEX FORMATION BETWEEN CUPROUS COPPER AND THE UN- SATURATED GASES - CO, C₂H₄ AND C₃H₆ - IN HYDROCHLORIC ACID SOLUTIONS

The nature and stability of the complex formed between cuprous copper and the unsaturated gases - CO, C₂H₄ and C₃H₆ - in hydrochloric acid solutions were determined. Unsaturated gas pressures from 0.1 to 0.8 atmospheres and hydrochloric acid concentrations from 1 to 6 molar were employed.

Through the use of gas solubility measurements and the law of mass action, it was clearly demonstrated that the main complexes formed are Cu(CO)Cl_2^- , $\text{Cu(C}_2\text{H}_4\text{)Cl}_2^-$ and $\text{Cu(C}_3\text{H}_6\text{)Cl}_2^-$. These complexes were shown to result from a simple displacement of a chloride ion in the CuCl_2^- ion by an unsaturated gas molecule and to exist over a wide range of unsaturated gas, cuprous chloride and hydrochloric acid concentrations. Formation constants and heat of formation values were determined for each of the complexes.

In addition, it was shown by calculation of the dissociation constants for the respective processes that the $\text{Cu(C}_2\text{H}_4\text{)Cl}_2^-$ ion and the $\text{Cu(C}_3\text{H}_6\text{)Cl}_2^-$ ion are appreciably dissociated into Cl^- and the $\text{Cu(C}_2\text{H}_4\text{)Cl}$ and the $\text{Cu(C}_3\text{H}_6\text{)Cl}$ complex species, respectively, in one molar HCl. The Cu(CO)Cl_2^- ion showed no evidence of such dissociation under the same conditions.

PART II. THE SEPARATION AND PURIFICATION OF COBALT AND NICKEL BY CONTINUOUS COUNTERCURRENT SOLVENT EXTRACTION

A continuous countercurrent liquid-liquid extraction apparatus consisted of a packed extraction-scrubbing column and a packed stripping column was constructed for general applicability to solvent extraction separations and was used to effect the separation of cobalt and nickel as their thiocyanates by extraction with methyl isobutyl ketone. The design and materials of construction of the apparatus were such that it may be used for any organic aqueous system except those which contain fluorocarbons and fluorides. The separation and purification of cobalt and nickel were performed to demonstrate the advantages of continuous solvent extraction and to show the ease of operation of the apparatus.

PART III. A SPECTROPHOTOMETRIC INVESTIGATION OF THE COMPLEXES OF COBALT AND THIOCYANATE IN DILUTE AQUEOUS SOLUTIONS.

The complexity of dilute solutions containing both cobalt and thiocyanate ions was investigated spectrophotometrically through the use of their ultraviolet absorption spectra. The method of continuous variations was used to obtain the mole ratios of cobalt and thiocyanate in any complexes that were formed. Cobalt and thiocyanate concentrations up to 0.02 molar were employed.

The investigation demonstrated the existence of the $\text{Co}(\text{CNS})^+$ complex ion. An approximate formation constant was determined for the complex in solutions of unit ionic strength. No evidence for any other complexes was obtained.

191 pages. \$2.50. Mic 57-2681

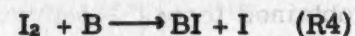
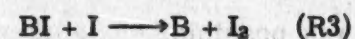
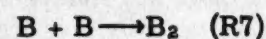
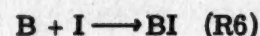
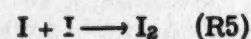
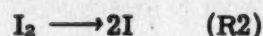
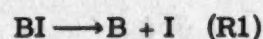
THE KINETICS OF THE THERMAL AND PHOTOCHEMICAL EXCHANGE BETWEEN BENZYL IODIDE AND IODINE IN HEXACHLOROBUTADIENE-1,3 SOLUTIONS

(Publication No. 21,787)

Moshe Gazith, Ph.D.
Columbia University, 1955

Kinetic and equilibrium studies led to the formulation of two types of mechanism for the reactions of organic halides with halogen atoms in inert solvents, (a) direct substitution, usually involving olefinic compounds,¹ and (b) radical intermediate, for saturated halides.² A mixed mechanism agreed in detail with the kinetics of the photochemical exchange between allyl iodide and iodine.³

In the present work benzyl iodide was exchanged with iodine-131 in hexachlorobutadiene-1,3 solution. The kinetic results were compared with rate equations derived from a proposed radical intermediate mechanism. Owing to the weakness of the carbon iodine bond in benzyl iodide (BI), the latter is assumed to dissociate along with the iodine molecules, and initiate chains. The mechanism is formulated as follows



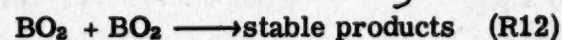
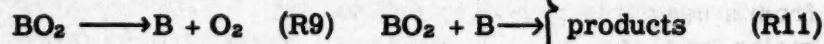
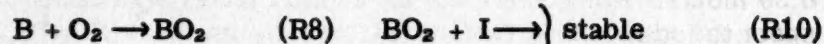
The predicted rate of exchange should depend on the concentration ratio $[\text{I}_2]/[\text{BI}]$. The limiting rates of the thermal reaction, denoted R_t^I and R_t^B , would be

$$\text{when } [\text{BI}] \gg [\text{I}_2], \quad R_t^I = k_t^I [\text{I}_2] [\text{BI}]^{\frac{1}{2}} \quad (1)$$

$$\text{and when } [\text{BI}] \leq [\text{I}_2], \quad R_t^B = k_t^B [\text{BI}] [\text{I}_2]^{\frac{1}{2}} \quad (2)$$

Experimentally it was shown that the presence of traces of oxygen was needed to verify this prediction. When solutions were degassed very thoroughly, at 60-90°C, the rate followed closely relationship (2) at all concentration values. When air was present, at 80°, the rate followed equation (1) up to $[\text{I}_2]/[\text{BI}] = 10$.

These kinetic changes could be accounted for by assuming that step (R7) is not significant in the absence of oxygen. Its apparent weight becomes increasingly important in the presence of oxygen, due to additional elementary reactions forming more stable benzoxy radicals, BO_2 . These radicals terminate more readily than the benzyl radicals, or may yield oxidation products. The additional steps proposed, are



The overall effect is an inhibition by oxygen, dependent on the ratio $[\text{I}_2]/[\text{BI}]$, accompanied by a change in the kinetic pattern of the reaction, from (2) to (1). The concentration of oxygen in the system, seems to determine the value of the ratio $[\text{I}_2]/[\text{BI}]$ at which the change in the kinetics will start to appear.

In the photochemical reaction, at 36°, using light of 546 mμ wavelength, benzyl iodide dissociation is much smaller than that of the iodine molecules. The absolute concentration of radicals, however, is higher than in the thermal reaction at higher temperatures, and rates are much faster. While step (R1) may be left out, step (R7) may be significant with large excess of benzyl iodide. The limiting rates predicted would be,

$$\text{when } [\text{BI}] \gg [\text{I}_2], \quad R_p^I = k_p^I [\text{I}_2]^{\frac{3}{2}} \quad (3)$$

$$\text{and when } [\text{BI}] \leq [\text{I}_2], \quad R_p^B = k_p^B [\text{BI}] [\text{I}_2]^{\frac{1}{2}} \quad (4)$$

The detailed agreement between theory and experiment was demonstrated, and in contrast to the thermal reaction, the rate was dependent on the concentration ratio when solutions were thoroughly degassed.

The kinetics of the slow photochemical decomposition of benzyl iodide was also studied. The rate of production of iodine in the absence of oxygen, according to the reaction mechanism, is $d[\text{I}_2]/dt = k_7 [\text{B}]^2$.

Most of the rate constants and other parameters could be evaluated. A value of 38 kcal was proposed for the C-1 bond strength in benzyl iodide.⁴ Wherever comparison

was possible, close agreement with reported data was obtained throughout this work.

105 pages. \$2.00. Mic 57-2682

1. R. M. Noyes and D. J. Sibbett, *J. Am. Chem. Soc.*, **75**, 767 (1953)
2. J. H. Sullivan and N. Davidson, *J. Chem. Phys.*, **19**, 143 (1951).
3. D. J. Sibbett and R. M. Noyes, *J. Am. Chem. Soc.*, **75**, 763 (1953).
4. M. Szwarc, *Chem. Reviews*, **47**, 124 (1950).

REACTIONS BETWEEN 2-IODOBUTANE AND IODINE IN SOLUTION

(Publication No. 21,795)

Raymond Anthony Herrmann, Ph.D.
Columbia University, 1955

The exchange and racemization reaction between 2-iodobutane and iodine in hexachlorobutadiene 1,3, were studied in the temperature range of 130° to 170°C., in order to determine if a free radical optical inversion reaction occurred in this system.

Both the exchange and racemization kinetics were first order in 2-iodobutane in the concentration range of 0.01 to 0.30 molar. For the exchange reaction the order with respect to iodine was more complex. It appeared to vary from a negative value at an iodine concentration of 4×10^{-4} molar, to a positive value with a concentration of 3×10^{-2} molar. This was especially so at the higher temperatures studied.

The exchange data were fitted with an empirical equation of the form

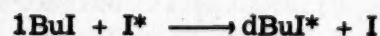
$$\frac{R_{ex}}{(BuI)} = \frac{A(I_2)}{B(I_2)^{\frac{1}{2}} - I}$$

where R_{ex} is the rate of exchange. For R_{ex} in moles per liter minutes⁻¹, and the concentrations in moles per liter, the constants A and B are given below.

Temperature	A	B
130.0°C	1.36×10^{-2}	100
149.45°C	4.98×10^{-2}	75
160.29°C	7.32×10^{-2}	55
170.36°C	1.84×10^{-1}	42

The racemization rate constants were used to calculate the ratio of racemization to exchange. These ratios appeared to increase with increased iodine concentration, attaining a maximum value of about 1.5 independent of temperature. Therefore it was concluded that an appreciable portion of the exchange reaction occurred by an optical inversion mechanism.

The activation energy was determined to be 27.8 k cal. for the racemization reaction. This value indicated an activation energy not greater than 10 k cal. for the inversion step below.



51 pages. \$2.00. Mic 57-2683

ANION CATALYSIS AND THE EFFECT OF ALCOHOLIC MEDIA ON THE IRON(II)-IRON(III) ELECTRON EXCHANGE REACTION

(Publication No. 21,796)

Ralph Albert Horne, Ph.D.
Columbia University, 1955

The overall rate of the iron(II)-iron(III) electron exchange reaction can be expressed by the equation

$$R = \sum_{A,n} k_{An} (Fe(A)_n^{-(nm-3)}) (Fe^{++})$$

where n anions, A, of charge m complex with iron(III) and k_{An} is the specific rate constant for the reaction involving catalysis by the anion, A. Values of k_{An} have been determined at 0, 10, and 20°C for $FeBr^{++}$, $FeBr_2^+$, $FeSCN^{++}$, $Fe(SCN)_2^+$, and $FeC_2O_4^+$ and are 4.9, 8.1, and 13.9; (19), 42, and 81; 4.2, 11.2, and 20.5; 41.2, 70.5, and 140; and 700, 1100, and 2140 sec⁻¹f⁻¹ respectively. The corresponding energies and entropies of activation for the reactions involving these complexes are 8.5, (14), 9.7, 11.3, and 9.2 kcal/mole and -25, (-3), -21, -13, and -14 cal/mole-deg respectively. Semi-quantitative determinations of the effect of nitrate, sulfate, cyanide, acetate, benzoate, succinate, frumarate, o-phthalate, and phenolate ions yielded results that were compatible with the above expression.

The association constant of the iron(III) monobromide complex ion was determined and found to be 0.807 f⁻¹ at 20°C and an ionic strength of 0.55 f and the heat of association 2.9 kcal/mole. Evidence was found of the formation of an iron(III) perchlorate complex ion and the value of its association constant estimated to be about 0.44 at 0°C and an ionic strength of 0.55 f.

Experiments in mixed solvents indicated that the rate of the reaction decreased as the mole fraction of non-aqueous solvent (acetone, methanol, ethanol, and n-propanol) was increased, and experiments in ethanolic media indicated that water plays an essential role in the iron(II)-iron(III) electron exchange reaction.

On the basis of previous studies and the above information a mechanism for the iron(II)-iron(III) electron exchange reaction is proposed in which the function of the complexing anion, which occupies a central position in the activated complex, is to bring the reactant ions into sufficient proximity to realize certain minimum spacing conditions, thus enabling the electron exchanging process to occur via a mechanism, possibly a hydrogen atom transfer, involving the waters of solvation of the reactant species.

166 pages. \$2.20. Mic 57-2684

A POLAROGRAPHIC AND SPECTROPHOTOMETRIC INVESTIGATION OF THE LOWER OXIDATION LEVELS OF RHENIUM

(Publication No. 21,668)

Lynn J. Kirby, Ph.D.
University of Michigan, 1955

Many inconsistencies are apparent in the present interpretations of the solution chemistry of rhenium. The nature of the anodic wave pattern observed on rhenide

solutions at the dropping mercury electrode has not been described with certainty. The values of the oxidation potentials of many of the rhenium couples are based upon incomplete evidence.

A polarographic and spectrophotometric study of the lower oxidation levels of rhenium was undertaken in order to clarify the nature of the anodic wave pattern observed on rhenide solutions at the dropping mercury electrode. The chemical significance of this aim is to permit the establishment or estimation of the electrochemical potentials characterizing the various rhenium couples; these potentials would comprise a quantitative and useful descriptive chemistry of rhenium.

The following procedure was adopted:

1. Polarographic and spectrophotometric examination of solutions of available rhenium compounds in which rhenium has the oxidation number of (III), (IV), (V), and (VII).
2. Polarographic and spectrophotometric examination of rhenide solutions successively oxidized to higher "equivalent oxidation states" by one-electron increments. These solutions were examined, as nearly simultaneously as possible, in three ways:
 - A. Polarographic examination of the solution;
 - B. Spectrophotometric examination of the solution;
 - C. Titration of a third portion to verify the oxidation state.

Aqueous solutions prepared by dissolving rhenium trichloride, rhenium dioxide, potassium hexachlororhenate (IV), rhenium pentachloride, or potassium perrhenate in 2 N hydrochloric acid, or in 2N sulfuric acid were examined polarographically and spectrophotometrically. X-ray diffraction patterns were obtained on rhenium, rhenium (I) oxide, rhenium (II) oxide, rhenium dioxide, and rhenium trioxide.

Solutions of rhenium in the "equivalent oxidation states" from (-I) through (VII) in 2N hydrochloric acid or in 2N sulfuric acid have been examined polarographically and spectrophotometrically. Calculations based upon the diffusion currents of the polarographic waves observed and on the absorbancies of the solutions indicate that the various "equivalent oxidation states" of (-I) through (VII) are comprised of the following species:

in sulfuric acid - rhenium (-I), (I), (IV), (VII);

in hydrochloric acid - rhenium (-I), (I), (V), (VII).

The presence of two or more species is necessary to stabilize a rhenium solution at an "equivalent state" of (O) through (VI).

Rhenium (III) and rhenium (IV), which are well-known in solid compounds, were not detected in any of the solutions of "equivalent oxidation number." Rhenium (II), which might have been expected by analogy with the highly stable manganese (II) in solution, was not detected. Rhenium (I) is definitely indicated in the solutions of "equivalent oxidation number"; it does not exist in the absence of other species. This would suggest that one might anticipate great difficulties in the preparation of a pure rhenium (I) compound.

The anodic wave pattern observed on rhenide solutions at the dropping mercury electrode results from the oxidation of rhenide in the steps (-I) to (I), (I) to (II), and (II) to (III). The oxidation potentials of the various steps have values ranging from 0.2 to -0.2 volts vs. the normal hydrogen electrode. With the rotating platinum electrode one can observe additional waves for the steps (III) to (IV) and

(IV) to (VII). The oxidation potentials of the latter two steps range from -0.3 to -0.5 volts vs. N.H.E. The initial step in the oxidation of rhenium (-I) is a reversible two-electron process. The potential of the rhenium (-I/I) couple at unit hydrogen ion activity and at 25° C. is 0.231 volts vs. N.H.E. The other oxidation steps observed are irreversible. 102 pages. \$2.00. Mic 57-2685

ANISOTROPY OF INFRARED ABSORPTION IN A SINGLE CRYSTAL OF ACETYLENE

(Publication No. 21,799)

Esther Krikorian, Ph.D.
Columbia University, 1957

The purpose of this research has been to observe in polarized radiation the infrared spectra of single crystals composed of simple molecules. Polarized infrared spectra of single crystals can provide information about the interactions of molecules in condensed systems. For the purpose of studying these spectra, one chooses a substance whose spectrum in the vapor state is well understood. Such substances are composed of simple molecules and crystallize only at very low temperatures. It is a prior problem, therefore, to develop a method for producing single crystals of appropriate cross-sectional area, suitable for spectroscopic measurements, of substances which solidify at low temperatures.

An apparatus for growing thin crystals of large cross-sectional area, and subjecting them to spectroscopic examination in situ, at a controlled temperature as low as that of boiling liquid nitrogen, is described. The apparatus is a modification of one previously used in these laboratories at the sublimation point of carbon dioxide. The technique of producing of single crystals by controlled growth from the vapor is described, and observations of the manner in which a crystal develops are noted. Acetylene was selected for this research. Single crystals of acetylene in two crystalline modifications were grown. Spectra, from 650 to 5000 cm^{-1} of the crystals thus grown, are presented. The spectral observations were made with a Perkin Elmer Infrared Spectrometer, Model 12B, equipped with a Golay detector and modified for double-beam operation permitting the direct recording of relative transmission. The spectra were observed with unpolarized radiation and with radiation polarized along each extinction axis on crystals of two thicknesses, at -150° C. and -190° C. The extinction axes of the crystals were first determined in visible light with crossed polaroids and then again by observing the difference in the infrared transmission intensity for several orientations of the polarized light in absorption bands found to be strongly polarized. Unpolarized spectra were also obtained for the isotropic modification at -130° C., and for a polycrystalline aggregate at -190° C.

The crystal spectra of acetylene exhibit much greater complexity than is found in the spectra of other crystals studied previously. This property is attributed to combinations of intramolecular modes and lattice modes. In contrast with the crystal spectra of other substances examined heretofore, wherein one observes mostly the unmodified intramolecular vibration frequencies as sharp

lines with very little fine structure attributable to interactions with the lattice, in the case of acetylene the opposite situation exists in which every component of absorption involves some significant interaction with the lattice. In addition, acetylene crystals are composed of ortho and para molecules causing the crystal to be dynamically "defective" or "disordered." A complete interpretation of these spectra cannot be given because of the presence of ortho and para modifications and because the unperturbed intramolecular frequencies are known only for the vapor. These difficulties are discussed, and experiments which might help to resolve them are proposed.

119 pages. \$2.00. Mic 57-2686

**THE KINETICS OF THE EXCHANGE
OF IODINE WITH IODOBENZENE
AND p-NITROIODOBENZENE**

(Publication No. 22,054)

Samuel Levine, Ph.D.
Columbia University, 1955

The kinetics of the exchanges of iodobenzene and of p-nitroiodobenzene with iodine in both hexachlorobutadiene and nitrobenzene solutions have been investigated.

Two reactions have been shown to be operating in the exchanges with iodine. One reaction involves two iodide molecules forming an intermediate which subsequently exchanges with iodine. The other is the exchange of the iodide with iodine atoms by a direct substitution of mechanism.

In hexachlorobutadiene as the solvent both mechanisms have been found to be operating in the exchanges of both iodides. However, in nitrobenzene only the second order reaction was found for the exchange of p-nitroiodobenzene, and only the iodine atom reaction was found for the iodobenzene exchange.

In nitrobenzene the exchange reactions of p-nitroiodobenzene and of iodobenzene were found to be faster than the corresponding reactions in hexachlorobutadiene.

55 pages. \$2.00. Mic 57-2687

**THE TRIODIDE ION COMPLEXES OF
AMYLOSE AND OF THE SCHARDINGER
DEXTRINS. THEORETICAL AND EXPERIMENTAL.**

(Publication No. 21,802)

Joseph Raymond Ligenza, Ph.D.
Columbia University, 1955

Further consequences of the Beckmann reversible step-reaction adsorption equation, which assumes n equal successive equilibrium constants, for the amylose-triiodide isotherm are studied. It was found possible to calculate the molecular weight of amylose from a rearrangement of this equation, but application of this equation to experimentally determined equilibrium isotherms yielded a molecular weight one-tenth of the most probable value. The value of the free triiodide ion concentration at

the half-saturation point of the complex is predicted by the equation to be independent of amylose concentration, which, though heretofore not observed experimentally, was corroborated by equilibrium isotherms.

The Bjerrum reversible step-reaction adsorption equation, which assumes n unequal successive equilibrium constants that are simply related to an intrinsic association constant, was studied for its applicability to the amylose-triiodide isotherm. This equation was also found to predict a half-saturation point independent of amylose concentration. The general Bjerrum equation resulted in four types of adsorption isotherms when n is large. One of these, a sigmoid shaped isotherm, was found to fit the experimental equilibrium isotherms for a reasonable value of the molecular weight of amylose, although quantitative information could not be obtained due to the complexity of the Bjerrum equation for these conditions.

Several experiments were performed to test a claim that amylose-iodine isotherms exhibit hysteresis when the amylose-iodine complex is back-titrated with thiosulfate ions. Similar results were obtained when arsenite ions were used. The hysteresis is demonstrated as being due to the formation of iodonium thiosulfate and iodonium arsenite ions at the low concentrations of iodine used in these studies. An experiment is described which demonstrates that the isotherms are reversible but not at equilibrium when constructed by the method of successive additions of iodine to amylose solution.

A theory of the kinetic processes, which assumes a reversible step-wise formation of the complex bimolecular to its formation and unimolecular to its decomposition is discussed. A number of rate equations for various conditions based on this model are derived. One of these equations is applied to kinetic data as an extrapolation technique to infinite time to obtain equilibrium adsorption data. Adsorption isotherms constructed by this method have the properties of the Bjerrum equation having a sigmoid shape. The saturation value of the complex from the equilibrium adsorption isotherms is found to be calculable theoretically only when it is assumed that amylose binds triiodide ions.

Electrostatic models are derived for amylose and the α - and β -Schardinger dextrans binding polarizable ions. In the case of amylose, the helical molecule is placed in a helical coordinate system and a binding energy equation for the amylose complexing its first polarizable ion is derived. The model is of sufficient generality to include the α - and β -Schardinger dextrin ring complexes and binding energy equations for their complex formation with polarizable ions are also derived.

The enthalpies of reaction for the α - and β -Schardinger dextrans with the triiodide ion in aqueous solution are measured and the results are found to be in accord with the electrostatic model. The free energies and entropies of these reactions as a function of temperature as well as the molecular weights of the dextrans were also obtained.

88 pages. \$2.00. Mic 57-2688

ANODIC STRIPPING VOLTAMMETRY AND OTHER STUDIES OF ELECTRODE PROCESSES

(Publication No. 21,991)

Gleb Mamantov, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Paul Delahay

Part I

Two methods are developed for the analysis of traces of metals (soluble in mercury) by anodic stripping from a stationary mercury electrode. Anodic stripping is carried out either by sudden switching of potential (potential-step method) or by passing a constant current through the cell (current-step method). A theoretical analysis is developed for both methods for conditions of semi-infinite linear diffusion. The following derivatives are given: equations for current-time, current-potential, and potential-time curves; diffusion current and transition time for the stripping process; sensitivity gain. Experimental results are discussed for the anodic stripping of cadmium from a hanging mercury drop, and theory and experiment are compared. Sensitivity gains with respect to voltammetry with stirred solution can be larger than 100. Application to analysis in the range of concentrations as low as 10^{-7} - 10^{-9} molar appears feasible. These two methods are compared with anodic stripping at continuously varying potential (Nikelly and Cooke).

Part II

The following mechanism is proposed for the discharge of negatively charged metallic complexes. (1) Reduction occurs simultaneously (a) by the direct electrochemical reaction of the complex and (b) with chemical transformation $MX_p^{-q} \rightleftharpoons MX_{p-1}^{-(q-1)} + X^-$ prior to reduction. (2) The relative contributions of these two simultaneous processes vary with potential. Reduction with preceding chemical transformation is predominant at potentials markedly negative with respect to the point of zero charge. Conversely, direct reduction is predominant at potentials somewhat positive with respect to the point of zero charge. There is a progressive transition from one extreme case to the other.

Experimental evidence based on the application of voltammetry at constant current is presented. The conclusions about the mechanism are based on the variation with current density (i_0) of the product of the current density by the square root of the transition time (τ). Chemical transformation prior to discharge corresponds to a linear variation of $i_0\tau^{1/2}$ vs. i with a negative slope. Conversely, the product $i_0\tau^{1/2}$ is independent of i_0 for direct discharge.

Positively charged complex ions which were studied are reduced directly. 67 pages. \$2.00. Mic 57-2689

THE MICROWAVE SPECTRA OF THE Tl HALIDES, GaBr AND GaI

(Publication No. 21,639)

Morton Mandel, Ph.D.
Columbia University, 1957

Data from the observed microwave spectra of the Tl halides, GaBr and GaI are analyzed in terms of molecular constants such as moments of inertia and vibration - rotation interaction constants. The quadrupole coupling constants determined in the present experiment are related to the molecular bond and the role of s-p hybridization in the molecular bond is discussed.

52 pages. \$2.00. Mic 57-2690

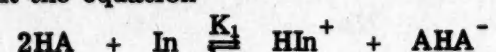
ACIDITIES OF STRONG ACIDS IN NITROMETHANE

(Publication No. 21,809)

Rosetta Victoria Natoli, Ph.D.
Columbia University, 1955

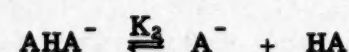
Acidity measurements in non-hydroxylic media have been largely confined to solvents of very low dielectric constant, where the anomalies found were attributed to association phenomena due to this factor. This research was undertaken in order to obtain information on the factors which influence acidity in nitromethane, a non-hydroxylic solvent of weak basicity and relatively high dielectric constant (39). Conductivity measurements indicate that it is a sufficiently weak base so that the acids studied can be considered to be unionized; the solvent acting only as a diluent.

The acidities of unbuffered solutions of sulfuric, hydrochloric, benzenesulfuric and methanesulfuric acids in nitromethane were measured spectrophotometrically using weak neutral base as indicators. The strengths of the acids were found to decrease in the order sulfuric, benzenesulfuric, methanesulfuric, hydrochloric. The results obtained at 21.2° C fit the equation



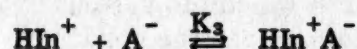
indicating that the anion formed is solvated by another acid molecule. This is in agreement with evidence found in the literature which shows that nitromethane has very little tendency to solvate ions, especially anions.

The acidity was found to be a function of temperature. Sulfuric, benzenesulfuric and methanesulfuric acids were studied at 37.4° C. The results obtained could be explained by assuming that the solvated anion dissociates with increasing temperature.



The acidities of sulfuric benzenesulfuric and methanesulfuric acids were also measured as a function of buffer concentration. A mechanism consistent with the behavior of the system was obtained by assuming that the buffer salt

and the salt of the conjugate acid of the indicator are ionized to approximately the same extent



72 pages. \$2.00. Mic 57-2691

LUMINESCENCE AND THE EFFECTS OF THE ELECTRONIC EXCITATION OF ORGANIC MOLECULES

(Publication No. 21,993)

Horace Anthony Ory, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Robert V. Nauman

When an organic molecule is excited electronically by absorption of ultraviolet light, many subsequent processes may occur. If the excited state is unstable the molecule may dissociate into radicals or ions; these may undergo electronic transition which may be detected. Other possible processes include fluorescence, the transition from the first excited singlet state to the ground state, and phosphorescence, the transition from the lowest triplet state to the ground state. If higher states are excited there may occur internal conversion to a lower state. In many cases there may occur intersystem crossing from the lowest excited singlet state to the lowest triplet state. Still other processes are possible, but this research is concerned primarily with those mentioned above.

Irradiation of benzyl chloride, benzal chloride, benzaldehyde, *o*-chlorotoluene, *o*-bromotoluene, benzyl sulfide, benzyl ether, benzyl ethyl ether, and possibly *o*-iodotoluene while they are dissolved in rigid media at 77° K. causes the same phosphorescence spectrum to be observed. The spectrum is assigned to phenyl carbene, a photolysis product, and the assignment is supported by evidence. A common emission from benzotrichloride and benzoyl chloride under the same conditions is attributed to phenyl chlorocarbene. Further, under the same conditions, N-4, 4'-dimethoxybenzohydrilidene benzyl amine is shown to yield N-4,4'-dimethoxybenzocarbene; detection was accomplished through its phosphorescence. A comparison of these results with those of other workers is made, and conditions are stated under which dissociation may occur.

The emission and absorption spectra of acenaphthene, acenaphthylene, and fluoranthene are reported from both solutions at 23° C. and rigid glassy solutions at 77° K. Acenaphthene gives the expected fluorescence and phosphorescence similar to naphthalene in energy and differing from those of naphthalene in vibrational structure. No acenaphthylene emission is found. A long wavelength absorption observed in the acenaphthylene spectrum is assigned to a van der Waals complex of acenaphthylene molecules. Two fluorescences and two phosphorescences are obtained from fluoranthene. These emissions of fluoranthene are believed to be real and caused by independent excitation of the naphthalene-like and benzene-like parts of the molecule; however, the interaction between the parts is considerable. This interaction is sufficient to

displace the emissions of both parts to lower frequencies than those that the emission of each part, if independent, would show; corresponding effects are observed in the absorption spectra. Absorption bands of fluoranthene are assigned to transitions involving the naphthalene-like and benzene-like parts. Assignments of the transitions of fluoranthene are supported by theoretical considerations. These results are summarized along with those of azulene, the pteradienes, and dimethyl fulvene, and a tentative principle, based on Huckel's rule for aromaticity, is stated for prediction of the occurrence of light emission by non-alternant hydrocarbons.

The electronic states of fluorene, dibenzofuran, dibenzothiophene, and carbazole are reported and interpreted. The influence of structural relationship on similarity of spectra is discussed. All four molecules show triplet states of about the same energy, but first excited singlet states of different energies. The phosphorescence emissions show similar vibrational structures, but the fluorescence emissions show quite different vibrational structures. The differences in energies between the first excited singlet states and the triplet states vary in the same manner as the fluorescence energies, since the triplet levels are almost equal in energy. The variation in the fluorescence energies is explained on the basis of the influence of charged resonance structures on the electronic energy levels. A triplet state configuration is suggested to explain the similar phosphorescences. Similarity of phosphorescence spectra of iso-electronic, and especially isosteric, molecules does not extend to fluorescence spectra because of the influence of charged resonance structures.

102 pages. \$2.00. Mic 57-2692

POLYMERIZATION AT HIGH PRESSURES: INVESTIGATION OF THE PRESSURE EFFECT ON THE INDIVIDUAL STEPS OF AN ADDITION POLYMERIZATION PROCESS

(Publication No. 21,647)

Joseph Pellon, Ph.D.
Columbia University, 1957

A high pressure apparatus was assembled which was capable of subjecting liquid samples to pressures up to 13,000 kg/cm² at regulated temperatures up to 100°C. A sensitive manganin resistance pressure gauge permitted the measurement of small changes in pressure which in turn allowed accurate measurement of the initial rate of polymerization. During the course of this study a new high pressure reaction vessel made of "Teflon" was developed and proven to be reliable.

In the polymerization of allyl acetate at pressures up to 8500 kg/cm² at 80°C it was found that (a) the rate of polymerization increases exponentially at higher pressures, (b) the exponential dependency of the rate on the initiator concentration decreases from a value of 1 at atmospheric pressure to 0.5 at higher pressures, (c) the molecular weight is only slightly affected by pressure, (d) the spontaneous decomposition of benzoyl peroxide in allyl acetate is reduced some 30% at 2500 kg/cm², and there is evidence of an induced decomposition at higher pressures. It is believed that the mode of termination which is predominant

at atmospheric pressure, namely "degradative chain transfer," does not occur at higher pressures where allyl acetate behaves like a typical vinyl monomer.

Investigation of the pressure effect on various aspects of styrene polymerization led to the following conclusions concerning the processes of chain transfer, initiation, propagation, and termination. (1) Pressure was found not to affect the styrene-carbon tetrachloride transfer constant (at 60°C). Thus the "activation volumes" for the chain transfer process and the chain propagation process are the same. A similar study into the styrene chain transfer with mercaptan showed mercury interference.

(2) Extension of peroxide decomposition studies to other solvents confirmed the previous results obtained in allyl acetate, and allowed the calculation of the "activation volume" for the process of spontaneous decomposition of benzoyl peroxide - $\Delta V_d^\ddagger = 4.8$ cc./mole at 80°C. This work was carried out in acetophenone in a "Teflon" vessel after it was found that mercury induces a decomposition at high peroxide concentrations.

(3) Through the unique application of emulsion polymerization kinetics, the pressure effect on the styrene propagation step was determined at 40°C. This allowed the calculation of the "activation volume" for the termination process - $\Delta V_t^\ddagger = 4.0$ cc./mole. This is believed to indicate that the process of termination becomes diffusion controlled at higher pressures, and the increased viscosity due to pressure results in a retardation of the rate of this reaction. 156 pages. \$2.05. Mic 57-2693

PART I. STUDIES OF COMPLEXES IN THE AQUEOUS URANIUM(VI)-CARBONATE-BICARBONATE SYSTEM.

PART II. THE SEPARATION AND PURIFICATION OF LITHIUM FROM SODIUM BY CONTINUOUS COUNTERCURRENT ION EXCHANGE.

(Publication No. 22,021)

John Allen Porter, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor M. D. Peterson

PART I

A series of investigations of complexes in the aqueous uranium(vi)-carbonate-bicarbonate system was performed to allow a more comprehensive description of the system.

The absorption spectra of the 1:2 and 1:3 uranium-carbonate complex ions were determined in much greater detail than previously reported. Several formerly unknown absorption peaks were discovered in the spectrum of each complex ion. Values were obtained for the wavelengths at which the absorption peaks occur and for the molar extinction coefficients.

Further proof of the existence of the 1:2 and 1:3 uranium-carbonate complexes was obtained by new methods. That the 1:2 and 1:3 uranium-carbonate complexes involve uranyl uranium rather than polymerized or hydrolyzed uranium(vi) was established by original methods.

Evidence was obtained for the existence of a previously unknown 1:1 uranium-carbonate complex in solution, for

which the formula $U_2O_5(CO_3)_2^{-2}$ is postulated. Evidence was also obtained for a recently postulated, but unconfirmed, 1:0.5 uranium-carbonate complex in solution $U_2O_5CO_3$ or $U_2O_5(OH)CO_3^-$.

The pH ranges in which the various uranium-carbonate complexes predominate and the conditions favoring their existence were determined.

The 1:3 uranium-carbonate complex ion was found to be too highly associated in the presence of even very small excesses of complexing agent to allow the determination of its formation constant by the spectrophotometric method. Formation constants for the less highly associated lower carbonate complexes also could not be determined by the spectrophotometric method, because of their coexistence with significant quantities of indeterminate uranium(vi) hydrolytic species.

An extensive search for uranyl-bicarbonate complexes was performed. The evidence obtained indicated such species to be nonexistent.

PART II

A Higgins-type continuous countercurrent ion exchanger was constructed from standard, readily available parts and materials. The separation of high purity lithium hydroxide from sodium hydroxide was performed to demonstrate the simplicity of continuous countercurrent ion exchange in laboratory-scale applications.

164 pages. \$2.15. Mic 57-2694

STUDIES OF THE CHEMISTRY AND FORMATION OF CERTAIN ALUMINUM SOAPS

(Publication No. 21,814)

David Henry Rakowitz, Ph.D.
Columbia University, 1955

Studies have been made of a large variety of aluminum laurate and aluminum ethyl hexoate soaps. Experimental evidence (including pH titrations, analyses, extractions, etc.) has been presented supporting the following postulated aluminum soap precipitation scheme for the addition of an aluminum salt to a solution of sodium soap plus an arbitrary excess of sodium hydroxide:

- I. Initially, any and all excess sodium hydroxide present is precipitated as hydrous alumina.
- II. Further aluminum salt additions are made into solutions of sodium soap buffered at pH 6 to 9 (the exact value depending upon the fatty acid used and the concentration of soap), so that hydrolysis of the aluminum ion to hydrous alumina takes place. Three moles of fatty acid are formed during hydrolysis for every mole of hydrous alumina; two thirds of this fatty acid reacts rapidly with the co-precipitated hydrous alumina to form disoap. The product of step II is therefore an equimolar mixture of aluminum disoap and fatty acid.
- III. The excess fatty acid produced in step II then reacts slowly with the hydrous alumina of step I. For an initial 50 percent caustic excess, just enough fatty acid is formed to convert all of the initially precipitated

hydrous alumina to disoap, so that the final product approaches disoap composition. In practice, an excess of less than 50% caustic must be used because of the loss of fatty acid during washing. This loss can be explained by taking into account the incompleteness of step III as well as the slight tendency of the disoap to hydrolyze, and so depends upon the water solubility of the fatty acid used. By varying the percentage of excess caustic, it is possible to precipitate either excess hydrous alumina or fatty acid in addition to disoap. The aluminum content of the product is therefore a continuous function of the amount of excess caustic used.

The only soap producing reaction postulated is that taking place between hydrous alumina and fatty acid to form disoap. By application of the proposed mechanism the compositions of many soaps prepared in a variety of ways have been explained. This mechanism also suggests that the polymeric structure of aluminum disoap is related to the ol and oxo structure of basic aluminum complexes.

A possible relationship between the coordination effects of basic aluminum salts and various aspects of aluminum soap behavior has been presented. With this in mind, the reaction of soaps with alcohols, the precipitation of soaps in the presence of various anions, the peptization of soap gels, and the formation of acid soaps have been discussed.

The only products formed by a variety of precipitation procedures appear to be aluminum disoap, hydrous alumina and fatty acid. The relative amounts of these products depend upon: the amount of excess caustic used, the time allowed for precipitation and digestion, the extent of washing, and the water solubility of the fatty acid.

A true aluminum trisoap cannot be precipitated from aqueous solution. An overall composition approaching that of a "trisoap" is exhibited by an equimolar mixture of disoap and fatty acid.

No true monosoap has been prepared in aqueous solution. Products, approximating overall "monosoap" composition, have been prepared by the addition of aluminum chloride to sodium soap plus 200% excess hydroxide, the addition of dibasic aluminum chloride to sodium soap, and finally, by the extraction of disoap with alcohol. The latter procedure produces a mono acid, mono alcoholate aluminum compound, while the preceding two yield equimolar mixtures of disoap and hydrous alumina.

Disoaps themselves have been prepared by a number of methods including: Addition of aluminum chloride to a solution of sodium soap plus 50% excess caustic; addition of monobasic aluminum chloride to a solution of sodium soap; addition of excess fatty acid to a suspension of freshly precipitated hydrous alumina; addition of sodium soap plus 50% excess caustic to a solution of aluminum salt.

151 pages. \$2.00. Mic 57-2695

SPACE GROUP ANALYSIS OF CRYSTAL COUPLING EFFECTS IN PARAMAGNETIC RESONANCE SPECTRA

(Publication No. 21,827)

Bernice Ginsberg Segal, Ph.D.
Columbia University, 1955

The effects on the paramagnetic resonance absorption spectra of single crystals, of spin-spin coupling between sites within a unit cell, governed by the symmetry of the factor group, and of the spin-spin coupling between unit cells, governed by the symmetry of the translation group, is investigated.

The symmetry of the crystal states at the site of the paramagnetic ion, as given by its site group, is first determined. Since spin states are involved in paramagnetic resonance absorption experiments, it is necessary to utilize the so-called "crystal double groups" first defined by Bethe,¹ as site groups. Then the coupling between the equivalent sites within a unit cell is introduced. This necessitates considering the symmetry of the crystal states under the factor group of the space group. It is usually found that there are states of the crystal which transform differently under all the operations of the factor group, and consequently differ in energy, but which have the same transformation properties under the operations of the site group at each of the equivalent sites in the unit cell.

Thus the coupling between sites within the unit cell produces, generally, a small multiplet of states of states for each state at the site before the coupling is introduced. The number of states in the multiplet cannot exceed the number of equivalent sites in the unit cell.

By a similar argument, the coupling between unit cells can be shown to produce a band of states from every state in the multiplet; each state within the band belongs to a different irreducible representation of the translation group and represents a different way in which the unit cells can couple.

Selection rules are determined group theoretically. The transition probability involves matrix elements of the form

$$(\psi_f | M_x | \psi_i)$$

where M_x is the x-component of the magnetic moment operator. The z-direction is defined as the direction of the constant magnetic field, and the small oscillating field, perpendicular to the constant field, which induces the transitions is taken to be in the x-direction. The well-known group theoretical condition for determining selection rules is that

$$\Gamma_f * \Gamma_{M_x} \times \Gamma_i$$

must contain the totally symmetric representation if the matrix element is not to vanish.

Because of the multiplets produced by the coupling between sites within the unit cell, we expect to see some fine structure in the spectra. This is not observed. The fine structure components therefore must appear as one broadened line, and it is our conclusion that any theoretical discussion of the breadth of magnetic resonance lines must include a consideration of the space symmetry of the crystal.

86 pages. \$2.00. Mic 57-2696

1. Bethe, H. Ann. d. Phys. 3 133 (1929).

CRITICAL PHENOMENA IN BINARY AQUEOUS SOLUTIONS; THE SYSTEM $\text{SO}_3\text{-H}_2\text{O}$

(Publication No. 21,891)

John Edmund Stuckey, Ph.D.
The University of Oklahoma, 1957

Major Professors: Dr. C. Harold Secoy, Dr. H. H. Rowley

This research presented a summary of the general field of critical phenomena and a specific introduction to the critical region of the binary aqueous system sulfur trioxide - water. Experimental procedures for obtaining pressure, volume, temperature, and composition data in the critical region were developed and a method of interpolation to find the true critical point of the solution was presented.

The corrosive nature of the system studied and the extremes of temperature and pressure in the critical region, prevented direct and simultaneous pressure-volume-temperature-composition measurements on the system. The four variables were thus related through two correlated experimental procedures.

A semi-micro phase study apparatus was used to relate the temperature at which the meniscus vanished to the composition of the solution and to the liquid fraction filling of the sample tube. Samples were sealed in quartz tubes, were accurately measured to determine the liquid fraction filling, and were electrically heated in a cylindrical aluminum furnace. Samples were observed through a telemicroscope to note the temperature and position at which the meniscus vanished.

Special equipment and techniques were devised to relate pressure to the other variables. A platinum lined stainless steel high pressure vessel was constructed in which the top closure consisted of a bimetallic diaphragm whose motion was restrained by two narrowly separated surfaces. The platinum-stainless steel bimetallic diaphragm separated the corrosive liquid from mercury which was used as a pressure transmitting agent. The pressure of the mercury was measured as its volume was decreased by a hand operated pressure piston and a graph of pressure vs. volume reduction revealed a plateau resulting from the movement of the diaphragm when the external pressure just exceeded the internal pressure. The apparatus was calibrated against pure water and a correction factor for the spring constant of the diaphragm was applied to the pressure readings. The apparatus was considered capable of measurements with an average error of about 0.1%.

The test of the practical application of the method of finding the critical point must await the accumulation of adequate data.

172 pages. \$2.25. Mic 57-2697

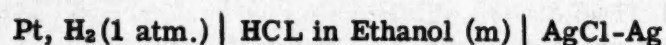
THE THERMODYNAMICS OF HYDROGEN CHLORIDE IN ETHYL ALCOHOL FROM ELECTROMOTIVE FORCE MEASUREMENTS

(Publication No. 21,402)

Harry Taniguchi, Ph.D.
Rensselaer Polytechnic Institute, 1957

Supervisor: Dr. G. J. Janz

Electromotive force measurements of the cell without liquid junction:



have been carried out at 25°C. over a concentration range from 0.0048 to 0.12 molal. New experimental techniques were devised and the latest computational methods were employed to obtain the standard electrode potential of the silver, silver chloride electrode in anhydrous ethanol and the activity coefficients of hydrogen chloride in ethanolic solutions at 25°C.

Preliminary to using the silver, silver chloride electrode, the method of preparation and the reproducibility of this electrode were fully examined. A satisfactory means of obtaining the thermoelectrolytic type electrode has been proposed and used in the present measurements.

A type of hydrogen electrode, designated the catalyst electrode, using a bright, unplatinized electrode and platinum black powder instead of the usual platinized foil, has been constructed, tested, and used in alcoholic solutions.

Methods of extrapolating electromotive force data to infinite dilution to obtain the standard electrode potential have been reviewed. Special reference has been made to the case of ionic association and the consideration applied to solutions of hydrogen chloride in ethanol.

The electromotive force measurements undertaken were necessitated by discrepancies existing in the literature. The value of -0.08138 volt was found for the standard molal electrode potential of the silver, silver chloride electrode in anhydrous ethanol. This value, and the molal activity coefficients of hydrogen chloride in alcohol computed from the data are advanced for adoption.

110 pages. \$2.00. Mic 57-2698

ADSORPTION KINETICS AND ELECTRODE PROCESSES

(Publication No. 21,996)

Isaac Trachtenberg, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Paul Delahay

The kinetics of adsorption on electrodes is studied for substances which are not reduced or oxidized at the electrode. Adsorption rates are derived for the plane electrode with control by semi-infinite linear diffusion, the streaming mercury electrode, and electrodes in stirred solution. Adsorption at the dropping mercury electrode is also considered briefly. To simplify the treatment it is assumed either (a) that the concentration of adsorbate is so low as to allow linearization of the isotherm, or (b) that the

concentration of adsorbate is so large as to correspond to full coverage. In the range of concentrations in which the isotherm can be linearized, adsorption with diffusion control is a slow process and the equilibrium surface concentration is reached only after a long time (perhaps 30 min.). This conclusion is verified experimentally by differential capacity measurements for the adsorption of n-hexyl alcohol on a hanging mercury drop in 1 M potassium nitrate. Data are also presented for adsorption on the dropping mercury electrode.

The effect of adsorbed substances on kinetic parameters for electrode reactions and limiting currents is discussed. Two effects of adsorption in overvoltage phenomena; namely, the decrease in effective area resulting from adsorption and the variations in kinetic parameters can be separated by determination of the electrode coverage from measurements of the double layer differential capacity. Application is made to the system Ti(IV)/(III) in tartaric acid medium in presence of n-amyl alcohol, cyclohexanol, and thymol. The rate constant characterizing the kinetics of the electrode reaction is essentially independent of coverage ($\theta < 0.4$) for the first two substances and decreases markedly for thymol.

The effect of adsorption on limiting currents is studied by polarography, the electrode coverage during drop life being determined from differential capacity measurements. Variations in limiting current with coverage at the end of drop life are studied for several systems, and it is shown that the decrease in limiting current depends primarily on two factors: the "size" of the reducible species and the structure of the adsorbed film. This conclusion is confirmed by current-time curves during drop life. The interpretation of complete waves complicated by adsorption of foreign substances is discussed, and application to the cadmium wave in the presence of n-hexyl alcohol is made.

Experimental methods are discussed in some detail, and a simple accurate bridge for differential capacity measurements without isolation transformer is described. An extrapolation method for minimization of contamination effects is discussed. It is recommended that the dropping mercury (amalgam) electrode be used in kinetic studies rather than the stationary hanging mercury (amalgam) drop.

79 pages. \$2.00. Mic 57-2699

THE PHYSICAL AND CHEMICAL COMPOSITION OF PHOTOCONDUCTIVE LEAD SULFIDE FILMS

(Publication No. 21,678)

Moe Stanley Wasserman, Ph.D.
University of Michigan, 1956

A study has been made of the physical and chemical composition of thin lead sulfide films, with particular emphasis of the relationships between method of film preparation, composition, and photoconductivity. This investigation has been prompted by the interest in the theoretical and practical aspects of photoconductivity in thin films, and the need for further information leading to an understanding of the mechanism of photoconductivity. The work has been divided into two parts: (a) a preliminary study of particle size, orientation, and chemical composition as a function of the method of film preparation and subsequent

treatment; (b) development of a procedure for preparing films of reproducible photoconductivity, and determination of the compositional features listed above in relation to the magnitude of the photoconductive effect. The techniques of electron diffraction and electron microscopy were used for the determination of film composition, and photoconductivity was measured in terms of the fluctuating voltage developed across the biased film when it is illuminated with an interrupted light source.

In the preliminary experiments with PbS films prepared by vacuum sublimation onto glass, the average crystallite size could be controlled between about 0.01 micron and 0.1 micron by adjusting the substrate temperature between 200 and 350°C. Crystallite orientation was essentially random in films on glass. On (100) faces of sodium chloride single crystals as substrates, films of PbS condensed at 100°C or higher consisted of single sheetlike crystals having the same orientation as the substrate.

The chemical effects of heating PbS films in air were studied because of the importance of this treatment in the photosensitization of evaporated films. The following oxidized phases were observed: PbO (orthorhombic form), $\text{PbO} \cdot \text{PbSO}_4$ (lanarkite), and $4\text{PbO} \cdot \text{PbSO}_4$. In addition, the basic carbonate, $2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$, was found in films which had been exposed to water.

In the study of photoconductive films prepared by vacuum evaporation and oxidation, the following observations were made:

- Appreciable photoconductivity is observed only in films built up with successive layers of PbS alternately condensed and oxidized by heating in air. The specific sensitivity observed ranges from 0.01 for the final oxidation at 290°C to 20 for the final oxidation at 465°C.
- Accompanying the increase in sensitivity is a progressive change in chemical composition of the film surfaces. Films of lowest sensitivity contain PbO (orthorhombic) as the only observable oxidized phase. As the temperature of oxidation is increased, $4\text{PbO} \cdot \text{PbSO}_4$ is formed in increasing amounts until the most sensitive films contain only this compound in the surface.
- Photosensitivity is strongly influenced by the preliminary treatment of the PbS powder from which the film is prepared, although no effect on this treatment appears on the surface composition of the film. Evidently the presence of a specific compound on the surface is not a sufficient condition for fixing the sensitivity.
- Photoconductive films on (100) faces of sodium chloride are much less sensitive than those prepared on glass by the same procedure, and the temperature dependence of resistance is different in films on the two substrates. These differences suggest the importance of a more extensive study of the films on sodium chloride.

These observations have been examined in terms of a current theoretical approach to the photoconductive effect. According to the proposed model, the presence of crystalline oxidized phases is not beneficial to photoconductivity. The observed correlation between sensitivity and surface composition in a particular reproducible series is so striking that a restudy of the theoretical model appears to be in order. Extensions of the experimental work are suggested.

150 pages. \$2.00. Mic 57-2700

ECONOMICS

ECONOMICS, GENERAL

SOURCES FOR CAPITAL FORMATION FOR ECONOMIC DEVELOPMENT IN NIGERIA

(Publication No. 21,841)

Abai Njoku Abai, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Paul T. Ellsworth

This thesis is concerned with the problem of the low level of per capita income in Nigeria. Materials for the study were drawn from historical and contemporary sources. Available statistical data were used to illustrate how administrative policies have affected the pattern of economic activities and the process of capital formation.

Evidence from the investigation indicates that economic development has its administrative base and is affected by it in public activities as well as in private business practices. The process of capital formation is one in which political, social and economic policies, each with its particular objectives, seem to determine the allocation of resources and the conditions under which the respective activities are carried out. The method of evolving policy-objectives for the various activities is administration which in turn reflects the interplay of those activities, their strength and weaknesses, their skill and ability to organize, combine and improve productive resources, and then the state of their final output such as the quantities of economic variables, their qualitative changes over time or even their relationships with one another.

The political and economic dependence of Nigeria on Great Britain greatly affected administrative policy-objectives and the course of economic activities. Difficulties of administration which have limited the rate of capital formation consist in three main factors. The first is the human factor in terms of shortage of trained and experienced technical and managerial staff, a situation which has hindered economic planning and distorted proper execution of policy-objectives. This difficulty is intensified by the wrong type of educational facilities in Nigeria and by the failure of foreign authorities to allow Nigerians responsible positions in private and public services.

The second administrative difficulty is the uncertainty of financial resources which led to discriminatory policies and unproductive investments. Funds have been derived primarily from indirect taxes and largely invested abroad for revenue and security reasons. The revenue reason, that of securing more funds, was shown to be faulty. Returns from investments abroad were shown to be far less attractive and much smaller than the returns on investments within Nigeria. Investments abroad reduce funds that would be available for domestic investment and increase the burden and capital needs of the economy. The problem of insufficient capital accumulation is one of improper administration of available funds rather than of inadequate funds. Both the revenue and the security

reasons are tantamount to the inability of administrative authorities to encourage, develop or provide local and alternative investment opportunities.

Finally, both the shortage of staff and the financial problems limited the range of government activities. As a result, important public services of the social overhead type have suffered considerable neglect. This means underutilization of resources, limitation in the capacity of private enterprises, difficulties of undertaking new ventures and of maintaining the existing public services.

Of the two groups of problems - shortage of trained and experienced personnel, financial problems and inadequate accumulation of real capital - only the financial position has shown a remarkable improvement in the recent years. Factors responsible for this change are external and unstable and not the result of substantial improvements in the organization of economic activities. This being the case, special attention was given in this study to certain fiscal and reorganizational measures, such as taxation, deficit finance and improvements in agriculture, which will ensure more dependable sources of funds and encourage increased productivity.

In general, insufficient real capital accumulation and the dearth of skilled personnel continue to plague the Nigerian economy. Since the future progress in capital formation depends upon efficient use of resources, this calls for vigorous efforts by Nigerian authorities and leaders to improve general administration, a process not easily attainable, at least in the next few years. Until such is the case the course of capital formation and economic development will continue to be distorted and retarded. Political and economic independence may be necessary, but it is not a sufficient condition for economic progress. It offers no easy path to rapid development.

249 pages. \$3.25. Mic 57-2701

ECONOMIC APPRAISAL OF THE YARMUK JORDAN VALLEY PROJECT

(Publication No. 21,848)

Nijmeddin Izzat Dajani, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Kenneth H. Parsons

This thesis aims at appraising the economic development of the Jordan Valley through comparisons of the present conditions and the anticipated effects of the comprehensive development of the Yarmuk-Jordan Valley. The proposed development project aims at irrigating 504,000 dunums by using the waters of the Yarmuk River, the Jordan River and streams and springs within the project area.

The method of analysis employed is the one generally known as benefits-costs analysis as recommended by the

United States Federal Inter-Agency River Basin Committee "Proposed Practices for Economic Analysis of River Basin Projects," with the procedure modified so as to give primary emphasis to those project effects which are anticipated to accomplish most toward relieving population pressure, unemployment and other similar maladjustments of the existing economy.

The discussion starts with a factual summary of the principal plans brought forward during the last few years. Only the framework of those plans, their significance, overall costs and benefits are presented.

The discussion then moves into a description of the present agricultural economy of the area to provide a background against which the contemplated development scheme may be appraised. This covers a description of the present structure of land tenure, water utilization, crop production, technology, marketing system and organization and agricultural credit, based primarily upon field research undertaken over the past five years.

A description of the future agricultural economy that would develop after the project construction follows next. The principal purpose here was twofold: (i) to describe the farm economy likely to develop with a primary emphasis on maximum settlement for as many families as possible and to enable each family to attain an adequate standard of living, measured by basic requirements for food, clothing, housing, education and health, etc., (ii) and to survey the outstanding potential overall economic and social effects of the project. This is followed by a benefits-costs analysis as a measure of the feasibility of the project.

Having established the feasibility of the project the analysis moves to discuss the problems that would arise from the implementation of the project and their policy implications. These problems are many and of diverse nature and include political and legal questions such as land acquisition, economic, social and administrative organizational problems; marketing and price problems and other technological and institutional problems. These problems are considered as basic and fundamental to the analysis rather than mere applied problems for the administrator.

The development of the valley would make it possible to irrigate the 504,000 dunums of irrigable land in the area on which would be created about 29,200 subsistence-type farms. Annual equivalent irrigation benefits of \$10,352,000 are estimated as likely to result from the plan of irrigation development with appropriate allowance, within a 100-year period of analysis for the development of normal farm input-output relationships. Total annual equivalent cost of \$4,131,500 are required in order to secure the annual project benefits. The resulting benefit to cost ratio is 2.5 to 1 which shows that the project is economically feasible. The project benefits include economic effects such as increase in employment, income and food production; reduction in relief expenditure; improvement in balance of trade; production of relatively cheap hydro-electric power; and social effects such as rehabilitation and stabilization of family and community organization.

The project would be possible, however, only on the basis of careful planning and the full development of the lands of the area. The whole area has to be placed under one organic control without regard to present land ownership lines. This would require the acquisition by public authority of either the ownership and/or use of private

land. Certain controls and limitations on the managerial freedom and responsibility of the farmers may be considered necessary in order to achieve the most efficient results of land and water use.

263 pages. \$3.40. Mic 57-2702

AN ECONOMIC APPRAISAL OF AGGREGATE LABOR TURNOVER IN MANUFACTURING

(Publication No. 21,837)

Sidney Goldstein, Ph.D.
The American University, 1957

Chairman: Melville J. Ulmer

A study was made of labor turnover in American factories. It was found that annual voluntary turnover varied from 7.5 to 62.3 percent of the work force in 1938 and 1943, respectively. Total separations in the latter year equalled 100 percent. These annual rates may, however, represent the same job or the same individual more than once.

There were definite seasonal patterns in each of three time periods since 1930. The highest voluntary moves occurred in September and the least quitting in the winter. Layoffs had a dampened seasonality especially during the war and December was usually the high point. A scissors-like relationship was found between quits and layoffs. Quits are considered to be the workers' evaluation of the economic environment and the key to the optimum distribution of labor.

The average cyclical patterns for turnover rates are as regular as a hypothetical business cycle model. Quits, dominant among separation rates was a leader on the upturn. Further, the rate of unemployment has a negative effect on the quit rate. The rates of quits, discharges and miscellaneous separations when combined furnish a minimum amount of "frictional"-type unemployment.

The rate of quits in manufacturing is presently at a low level, about like the rates during the depression of the 1930s. Possible reasons for a long-term decline were sought among various demographic, institutional and economic determinants of turnover. Some of these determinants were undergoing changes which may result in greater worker movement. Increasing age of the labor force, length of service and seniority and pensions are all related factors tending to reduce turnover. The labor force will have greater future concentration in the lower age groups and increasing portable pensions may tend to increase the rate of voluntary turnover. Female workers had a higher quit rate in every industry, because of family responsibilities. Furthermore, nonwhite employees were found to have higher mobility; this is being dissipated with their occupational and educational progress. Insofar as education and home ownership are influences, there is no consistent pattern making for less inter-plant movement.

Among insitutional and economic factors, unionism has been thought to contribute to stability in plants. Union members have been found to both corroborate and negate this axiom. Recently union policy has tended towards portable pensions and other arrangements to

allow for more mobility. Also the narrowing of wage differentials may serve to decrease voluntary movement; this places greater emphasis on nonwage items. There are great variations between industries in the quit rate and much dispersion among plants. Also, there are varied patterns for different occupations; the decreasing unskilled portion of the labor force may also have tended to lower the quit rate. Finally, there is a slight bias of stability among larger plants. Contrarily, company opinion was that lower rates should accompany smaller establishments.

Companies proceed on the assumption that voluntary turnover is a great cost and must be reduced. This presents a social problem. The cost of turnover was found to be little enough to pay for the continued mobility of a work force. Although there has been a tendency toward fewer quits, there are definite indications in the changing age, security, racial and occupational composition to ensure that the "new feudalism" will not shackle our growing economy.

372 pages. \$4.75. Mic 57-2703

ECONOMICS, COMMERCE — BUSINESS

PROBLEMS IN THE APPLICATION OF STATISTICAL QUALITY CONTROL TO A MANUFACTURING PLANT

(Publication No. 21,986)

Chung Wei Chen, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Perry F. Boyer

The purpose of this dissertation is to study the advantages of statistical quality control in a war product plant, to set up a theoretical organization operating in the plant, and to apply statistical methods to quality control of the manufactured products.

The introduction gives the fundamental change in the concept of inspection, the historical development of statistical quality control to modern manufacturing plants.

A discussion of general principles and methods of statistical quality control and a review of the conventional methods of control charts for variables are presented.

A study was made of the organization and manufacturing process of a plant with an idea of applying statistical quality control principles. This war product plant has not applied statistical quality control but has used one-hundred per cent inspections at many points to screen out the defective goods. This practice is limited by the psychological law of diminishing efficiency. An application of statistical quality control in the plant would result in a saving of the excessive cost of inspection and would guarantee an improvement in quality.

Applications of statistical quality control to modern manufacturing plants are important; also important is a suitably organized statistical quality control group in the plant. The presentation of various existing organizational patterns provides a means for the comparison of their advantages as well as their disadvantages. The most advantageous organization of a statistical quality control

group in a modern manufacturing company is suggested as the authoritative pattern, although it has not yet been used. Consideration has been given to the size of the war product plant in devising a statistical quality control group that is held to be suitable to the operation of that plant.

A practical application of statistical quality control is made in connection with some of the work done in the war product plant. The over-all rate of rejection in that plant has always been high, but difficulties leading to rejections are by no means experienced in all parts of the plant's production. This discovery points to the need for reducing over-all inspection and for concentrating attention on the seriously troublesome parts. Some of the most serious production problems in the manufacturing process are analyzed; assignable causes are detected; and corrective actions are suggested. Managerial conclusions are reached regarding the organization, manufacturing process, and inspection methods.

124 pages. \$2.00. Mic 57-2704

THE MERGER COMPONENT IN THE GROWTH OF A FIRM

(Publication No. 22,016)

Bernard Allen Kemp, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor George W. Stocking

In discussing the problem of mergers, analysts are handicapped by not being able to determine the importance of external growth (mergers and acquisitions) to the growth of a firm. Attempts to develop a measure have been made by the Federal Trade Commission, The Merger Movement: A Summary Report (Washington: 1948); Gertrude G. Schroeder, The Growth of Major Steel Companies, 1900-1950 (Baltimore: 1953); and J. Fred Weston, The Role of Mergers in the Growth of Large Firms (Berkeley: 1953).

Weston's study is the best and most comprehensive but he uses a single terminal year, 1948, for measuring the proportion of external to total growth. If different years had been selected, would the ratio be the same? If not, how much variation would there be? Is there any pattern to this variation over time? In order to answer these questions I develop a measure showing the proportion of external to total growth over time.

To discover the problems involved I carefully reviewed Weston's basic data sheets for 24 large companies. The problems concern the nature of the measure, the definition of the corporation, the total growth series, and the external growth series. More specifically, under these general categories I analyze and develop standards for handling such problems as the definition of internal vs. external growth, alternative measures of growth, the effect of the secular rise in price levels, the method for handling the acquisitions of partly owned subsidiaries, and the valuation of external growth.

I then apply the measure to General Electric Company from 1893-1948 to determine its proportion of external to total growth. When assets for the first year are included

in external growth, the ratio varies from a high of 187.1 per cent on January 1, 1899 to a low of 15.7 per cent on December 31, 1948. The trend, or average value, for 1917 was 39.9 per cent and for 1948, 27.1 per cent. When the initial assets are excluded from external growth the proportion of external to total growth of GE ranges from a low of 0.2 per cent in 1893 to a high of 37.0 per cent in 1932, and back to 11.2 per cent in 1948. The average for this measure between 1917 and 1948 was constant at 21.7 percent. The two different measures set the upper and lower limits of the ratio. The intermediate values depend upon an arbitrary allocation of the initial year's assets between internal and external growth. But regardless of which measure is used, the actual results for 1948 are substantially below the trend values. Thus for GE, at least, using 1948 as a terminal year substantially understates the importance of external to total growth.

External growth has important effects on the subsequent growth of the acquiring company and on the structure and performance of the industry which cannot be measured. They come from the nature of the acquired company and its growth potential, other practices of the acquiring company, the difficulties in determining control and divestitures which were the result of government action. I use the information developed in the case study to determine the effect of these qualitative factors. They contributed substantially to the importance of mergers on the growth of General Electric Company and to their effect on the structure and performance of the electrical equipment industry.

255 pages. \$3.30. Mic 57-2705

TOP-MANAGEMENT ORGANIZATION AND CONTROL OF INSURANCE COMPANIES

(Publication No. 20,469)

John Seward McGuinness, Ph. D.
Stanford University, 1955

The study was designed:

1. To draw a clear and comprehensive picture of the main problems met by top managers in running an insurance company.
2. To describe similarly some of the best methods which are used by top managers in meeting such problems.
3. To derive from these descriptions a coherent and generally applicable framework of basic managerial functions and practices.
4. To evaluate some of the possibilities for greater efficiency that such an orderly arrangement or framework might suggest.

Based on personal knowledge of the writer and on information secured from company officials, state regulatory officials, auditing firms, leading educators, and officials of insurance trade organizations, a diversified group of some fifty American companies and company groups notable for progressive management was chosen. The greatest possible diversity in size (but with a preponderance of larger firms), geographic location, types of

insurance underwritten, financial structure, and basic managerial structure was aimed at. From this group the participation of sixteen was obtained.

A questionnaire was developed, based on one previously used to survey twenty-five insurers in four European countries. Information was obtained by interviews with senior executives and review of written records during visits of from three to six weeks to the companies' home offices. In addition to data on which companies would form the best sample, the amount and quality of information on managerial practices obtained from hundreds of trade-organization and governmental officials contracted, as well as from many executives in companies not participating in the study, was a valuable supplement to that obtained from the participants and provided a broader perspective on many problems.

The report of findings stresses certain quantitative concepts of control which are basis to major mechanization of present procedures: (1) substitution of statistical measurement for specific measurement; (2) the complementary nature of measures of similarity and diversity; (3) the notion of credibility; (4) substitution of tolerances for single limits; (5) the notion of a limiting process; and (6) the complementary nature of analysis and synthesis in attacking a problem.

Operational research techniques are used to point the way to major simplifications in underwriting, reinsurance, and rate-making processes, simplifications which are based on a statistical method of setting net underwriting retentions. Ways are suggested to adapt these simpler processes to currently available means of mechanically processing information to reduce the needed number of clerical and technical people. Simplifications and realignments in present product lines--changes which dovetail with suggested changes in processes--are also proposed as possible sources of significant savings, improved customer service, and a better product.

Results which also apply to businesses other than insurance include:

1. A new concept of the continuous, evolutionary nature of line, committee, and staff and a precise statement of their relationships to each other as stages in organizational development.
2. An integrated concept of the place of general or coordinative staff in business, developing more completely some of the work of L. Urwick.
3. Identification for the first time of liaison staff in business and its integration into organizational theory.
4. A general concept encompassing for the first time in one orderly system the various kinds of descriptions of organization and activity.

545 pages. \$6.95. Mic 57-2706

AN AIRPORT FOR AUSTIN—A COMPARATIVE STUDY

(Publication No. 21,034)

Richard Sanborn Nelson, Ph.D.
The University of Texas, 1957

Supervisor: Professor H. K. Snell

This dissertation presents a detailed account of the history, financing, and operations of the Robert Mueller Airport, the municipal airport of Austin, Texas. For purposes of comparison and contrast, the municipal airports of Abilene, Lubbock, Midland, and Waco, Texas were similarly analyzed.

For each of the cities a history of the airport development and support by the community was drawn from personal interviews and newspaper accounts. The magnitude of capital costs for airports at medium size cities was reviewed to indicate the variety of capital cost problems facing such cities. Abilene built its airport on virgin land with the city sharing nearly 60 percent of the cost with the federal government. Lubbock, Midland, and Waco received the bulk of the physical facilities from military development during the war. Austin has shared about one-half its airport capital costs with the federal government.

Only one of the airports included in the study maintained cost accounting by airport function during fiscal 1955. The analysis of revenues and expenses for each airport, except Lubbock, includes estimated allocation of expenses and revenues to the airport functions of Terminal and Administration, Landing Area, Hangars, and other. These estimates are based on the judgement of city officials and upon airport original accounting records. In this manner, the net revenues of the various airport functions are estimated. Upon these estimates are based conclusions concerning the assessment of rentals, user charges, and the municipal operation of concessions (such as the fueling facilities).

A review of the organization for management of each of these facilities reveals important differences in the performance of the function of executive leadership over airports. The channels of authority and responsibility and the salaries accorded to airport executives are related to the problems of administration of the airport function in a community.

On the basis of these analyses some general conclusions concerning municipal airports at medium size cities are drawn. These conclusions concern the role of the community in financing and operating an airport, the need for private business initiative in best developing the function, and the relationship of the municipal airport to an integrated national air transport network.

Finally, some specific conclusions are drawn concerning the Austin municipal airport and recommendations made regarding the organization structure for management, the accounting practices, assessment of rentals and user charges, and the importance of a positive and clearly defined community airport policy.

175 pages. \$2.30. Mic 57-2707

AUDITING STANDARDS,
THE LAW AND THIRD PARTIES

(Publication No. 21,672)

Roland Frank Salmonson, Ph.D.
University of Michigan, 1956

The purpose of this study is to determine the auditing standards to which independent public accountants must adhere in order to fulfill their obligations to third parties --the client's investors and creditors--under the common and statutory law. Many factors have accounted for the increased demand for and reliance upon independent public accountants' opinions. As the demand for capital increases, more and more persons from all walks of life will be asked to supply this capital. The independent public accountant thus has a responsibility to an ever-increasing proportion of society. Unfortunately, the average accountant is not as fully aware of his legal responsibility to third parties as he should be.

All of the cases brought under the common law against accountants by third parties are reported and analyzed. No cases of significance have been brought against accountants under the provisions of the two major Federal laws affecting accountants--the Securities Act of 1933 and the Securities and Exchange Act of 1934--therefore, a study of the accountants' responsibility to third parties under statutory law is limited to a study of the Securities and Exchange Commission's administration of these Acts. Some of the Commission's cases and hearings containing criticisms of the accountants are reported and analyzed. Specific attention is paid to the conduct of the accountants which induced the action or hearing against them. In most instances, the accountants' conduct was compared to the accounting profession's current generally accepted auditing standards. The various decisions reached were analyzed, primarily from the viewpoint of the accountant, in an effort to reach a conclusion as to their correctness.

The study shows that, under the common law, accountants have not been held liable to third parties for negligence, although the possibility exists under certain unique circumstances. They can be held liable to third parties for fraud, and in this respect, the intent to deceive, necessary to support an action in fraud, is usually inferred from the accountants' gross negligence. Accountants can be held liable to third parties for negligence under the Securities Act, while the Securities and Exchange Act imposes a liability which is stated in terms similar to the common law's fraud doctrine.

The accountants in the common law cases reported violated the accounting profession's modern generally accepted auditing standards, and, in several instances, violated the profession's prevailing standards. In virtually all of the Commission's hearings and cases, the accountants also violated the profession's prevailing standards.

One conclusion drawn, based upon the exoneration of the accountants in a number of the cases, is that the common law's auditing standards are inferior to the accounting profession's. This is even more true today, since the law found in the earlier cases is still the law today, while marked improvements have been made in the profession's standards. A second conclusion is that the statutory law's standards, insofar as found in the Commission's administration of the law, are the same as the accounting profession's standards. The final major

conclusion, supported by an analogy, is that accountants will some day in the future be held liable under the common law for negligence. Then the profession's and the common law's auditing standards will be the same.

326 pages. \$4.20. Mic 57-2708

**AN INVESTIGATION OF POSSIBLE DIFFERENCES IN
COST STRUCTURE AND METHODS OF OPERATION
OCCURRING AMONG ARKANSAS DRUG STORES**

(Publication No. 21,957)

Franklin Springer Williams, Ph. D.
University of Arkansas, 1957

Major Professor: H. W. Frey

It was the purpose of this study to find out whether there were differences in the cost structure and methods of operation among Arkansas drug stores which would offer possible answers to the question of how higher net returns may be attained; and, if such differences did exist, to investigate their nature. Data obtained through the use of questionnaires was analyzed after first dividing the eighty-four firms investigated into an above- and a below-average profit group on the basis of net returns for 1955. Finally, case studies of five drug stores were made to enlarge previous observations and to investigate management procedures not covered by the questionnaire.

A comparison of above- and below-average firms indicated that two of the four costs investigated--cost of goods sold and employee wage cost--appeared to be the most productive sources of cost reduction. On the other hand, a relatively wide range was noted in each of the four costs reported.

Of the five case studies made, three were for above- and two for below-average firms. This study indicated that the principal difference in the methods of operation of the above- and below-average firms analyzed was due to the difference in the skill of management in accomplishing the various phases of administration.

Since there was evidence that above-average firms more frequently reported cost reductions in employee wage cost and the cost of goods sold, it is concluded that these costs--particularly if they are above the usual percentage--should be among the first considered as potential sources of cost reduction. The objective, however, should be the proper utilization of inputs to produce maximum revenue, not cost reduction for its own sake.

Success in attaining increases in sales volume and net returns did not appear to be definitely related to the use of any one of the particular merchandising and sales promotion methods investigated, with the exception of store modernization. It was concluded that although various merchandising and sales promotion procedures may be valuable to the firm, it is the proper combination of such procedures, in the proper amounts, which is the determining factor in the achievement of the results desired. This is possible chiefly through the administrative skill of the manager. Similarly, it is not the availability of any particular tool of control but the administrative skill in the use of all such controls which appears to be the deciding factor in the results obtained.

Because of the small number of cases involved, it was not possible to draw broad conclusions regarding the particular operating procedures to be followed in the realization of higher net returns. On the other hand, the five case studies indicated that administrative skill is important in the attainment of the firm's objectives. This suggests that something different from technical proficiency in the routine operations being managed is required.

172 pages. \$2.25. Mic 57-2709

ECONOMICS, FINANCE

**CURRENT CONCEPTS ON COST AS A
BASIC FOR DEPRECIATION**

(Publication No. 21,785)

William Crawford Flewellen, Jr., Ph.D.
Columbia University, 1957

For approximately three decades the proper basis for depreciation computation has been one of the controversial topics of accounting literature. This dissertation collects, summarizes, and examines the views of the accounting profession, economists, labor leaders, management, federal agencies, and the United States Supreme Court.

With some dissents the accounting profession, management and labor leaders have taken a position favoring the historical basis for use in the accounts with supplementary statements to reflect the effects of fluctuating price levels. There is little agreement as to the methods to be used to develop the supplementary statements.

Federal regulatory agencies have preferred a classification of costs to segregate original cost to the user who first devoted the assets to public service. Depreciation charges must be computed on this basis while the excess of cost to present owner over original cost is amortized but has not usually been treated as an operating cost.

The United States Supreme Court after supporting a "fair value" doctrine for public utility rate base purposes from 1897 to the 1930's turned to support of the position taken by the federal regulatory agencies. The Court has consistently supported the historical cost basis for income tax and excess profits tax purposes.

Economists have generally agreed that the historical cost basis has many disadvantages and is in fact misleading. There is little agreement on a more acceptable basis except that current cost should be reflected.

Advocates of adjustments of historical costs point out that management needs current and future costs; that current cost is a more accurate measure of the cost of service capacity utilized, and that its use is more conservative. Current cost depreciation promoted maintenance of productive capacity, proper distribution of income, and proper allocation of resources as well as equitable tax treatment by eliminating "fictitious" profits. The computation of national income is made more accurate and business cycles made less intense by the use of current cost depreciation.

Advocates of the historical cost bases point out that management for the most part has knowledge of the effects

of fluctuating price levels on profits and is not misled in its decisions by "fictitious" profits. The taxation aspects of the problem will hardly be solved by adoption of a current cost basis for depreciation.

Historical cost is considered to be the best starting point for further analysis and interpretation for it is the most objectively determined basis. Furthermore, historical cost is useful. It is said that accounting must be concerned with recording facts and not with estimating outside factors by questionable methods.

The confusion that would result from adoption of current cost depreciation would offset any advantages while many firms find that depreciation is not a significant item and others say that current cost is of little moment to the going concern.

A major argument is that depreciation is a process of allocation and not of valuation in terms of current cost. Replacement is a matter of financial management and over the past decade and a half historical cost depreciation has retained sufficient revenues, when earned, to replace discarded units.

National income computation cannot become the major purpose of accounting for the business firm but current cost depreciation would improve accuracy in national income determination very little. The effect of depreciation accounting on business cycles is debatable. Some economists have stated that historical cost is more stabilizing than current cost if current cost is recognized for tax purposes.

It is concluded that depreciation charges based on historical cost have sufficient usefulness to be retained and that supplementary statements reflecting the effects of fluctuating price levels would be useful and promote honesty of representation. 235 pages. \$3.05. Mic 57-2710

PERSONAL DEDUCTIONS IN THE INDIVIDUAL INCOME TAX

(Publication No. 21,855)

Charles Harry Kahn, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Harold M. Groves

This study examines for the period 1918-1952 the functioning and importance of the personal deductions under the income tax. The personal deductions are distinguished from the so-called "exclusions" in that they represent expenses rather than receipts, and from a host of other allowable deductions in that they are connected with expenses of a personal rather than a business or occupational purpose. In one form or another personal deductions have been present in all our federal income tax laws. The major personal deduction allowances have been those for philanthropic gifts, personal interest expenses, various nonbusiness tax payments to states and localities, medical expenses, and in recent years the standard deduction.

We find at the outset that there exists little recorded any systematic explanation for the various personal deductions, and it is apparent that they were not conceived according to a single, unified concept of income tax. Three reasons for their existence emerge from an

examination of the rather scant record. Some deductions may owe their existence, at least in part, to the lack of definition of the income concept underlying the tax. An example of such possible inadvertence is the continued allowance for taxes paid since the inception of the United States income tax. A second reason is the achievement of greater interpersonal equity than might be obtained with any economic concept of net income alone. This appears to be the case with the medical deduction. A third reason is the desire to provide incentives for given outlays through the tax system as in the case of gifts to philanthropic institutions. In the course of the study we examine the major deductions with respect to their place in an income tax, their relation to other deductions, and in the case of philanthropic contributions, medical expenses, and personal casualty losses the form each deduction has been given in relation to the objectives it is presumed to serve.

In presenting a quantitative picture of the personal deductions we first dealt with the totals and next separately with each of the major deductions mentioned above. The totals were compared, for the period 1918-1952, to such relevant magnitudes as income, the personal exemptions, and the tax base. An attempt is also made to examine the effect of the deductions, in the aggregate, on tax liabilities for the year 1951. This was done by size of income, as reported on taxable returns, as well as for the total (in the latter case including estimated deductions not reported on taxable returns).

It is found that of adjusted gross income reported on taxable returns an estimated 7 per cent was accounted for by personal deductions in 1918, 10 per cent in 1939, and 13 per cent in 1952. In contrast, personal exemptions showed very little, if any, change in trend over that period. They constituted about one-third of income reported on taxable returns in most years. Thus, in 1952, of \$197.3 billion adjusted gross income reported, \$64.5 billion was absorbed by personal exemptions, \$24.7 billion by personal deductions and \$108 billion constituted what is commonly referred to as the tax base.

Of the \$24.7 billion personal deductions reported on taxable returns in 1952, \$12.1 billion, or almost one-half, was taken in the form of the optional standard deduction available to all taxpayers since 1944. The rest was divided in the main as follows: \$3 billion each for nonbusiness taxes and philanthropic contributions; \$2.1 billion for personal interest; \$1.8 billion for medical expenses, and some \$2.4 billion for miscellaneous items several of which, though included in this category for administrative reasons, were not truly personal in nature. Each of these major deduction items was analyzed in detail with respect to its distribution by income groups, its relation to income over time, and its size relative to the estimated country-wide total of the deductible expenditure.

The major source of the data presented are the annually published *Statistics of Income of the Treasury Department*. 297 pages. \$3.85. Mic 57-2711

**ALLOCATION OF MULTISTATE INCOME UNDER
STATE CORPORATE NET INCOME TAXES
(VOLUMES I AND II)**

(Publication No. 20,047)

John Alwyn Wilkie, Ph.D.
The University of Wisconsin, 1956

Supervisor: Professor Harold M. Groves

1. Statement of the Problem

This dissertation is an attempt to define and determine a uniform and reasonable basis both for state jurisdiction to levy a net income tax on corporations and for allocating income of corporations which is derived from sources within two or more states and to propose means of implementation of such standards by the various states involved. Current diverse practices of the states lead to numerous and substantial inequities and inefficiencies due to over or under allocation of taxable income, discrimination as between similar taxpayers, and lack of administrative workability.

2. Procedure or Methods

The procedure in this paper has been to review the law and practices of the various states involved with particular emphasis on Wisconsin; to review various proposals recommended by committees of groups concerned with the problem and authorities and critics on the subject; to analyze the possible alternative methods of dealing with the problem recommending a solution to the allocation problem for uniform adoption by the states; and lastly to examine the merits and demerits of various possible methods of implementing uniform standards of allocation which are recommended.

3. Conclusions

With respect to the basis for state jurisdiction to levy a net income tax on the basis of neutrality (including consistency with the methods of allocating multistate income) constitutionality and administrative and compliance workability, the "source of income" method is recommended as first choice even though it may be less feasible from an administrative and constitutional standpoint (because it treats sales on a destination basis) than the other bases which are considered.

With reference to defining uniform standards for a reasonable and uniform determination of the allocation of multistate income of corporations certain conclusions are reached. Unitary business is defined and determined upon a basis of actual interrelationship in fact. Uniform apportionment formulae are considered most desirable for allocating multistate income of unitary business. The main finding as to the situs of non-apportionable income is that income from intangible property should be specifically allocated to the state of commercial domicile which is determined by the primary locus of the corporation's property and payroll. The uniform apportionment formula recommended for manufacturing and merchandising business is composed of the three factors of property, payroll, and receipts equally weighted. The receipts factor should be defined to include receipts from products sold or services rendered in the unitary business operation. The situs of such receipts should be determined either exclusively upon a destination basis, or inclusively upon some

activity standard basis. Where the unitary business is engaged in by two or more commonly owned and/or controlled legal entities, similar uniform standards of allocation would apply to the business as a unit rather than as separate entities.

For purposes of implementation of the proposed uniform allocation methods among the relevant states, it is concluded that their adoption by voluntary actions of the states is not apt to be achieved within the next decade or two and that either an interstate compact or some direct and/or indirect federal action is necessary. The latter would fulfill the obligations of Congress under the federal constitution to regulate "commerce among the several states" as well as to promote the general welfare of the nation. It would do this by requiring neutrality of tax treatment as between similar corporate taxpayers, deriving income from sources within a state or states which levy a corporate net income tax.

Qualification

If certain uniform standards of tax jurisdiction and income allocation and certain methods of implementation among the various jurisdictions involved are considered preferable on the basis of desirability and feasibility, the attempt to achieve a uniform basis for tax jurisdiction among the states involved should not be abandoned merely because the most desirable basis is presently unacceptable. Uniform rules of tax jurisdiction and allocation which are now accepted by many of the states concerned are preferable to the present non-uniformities.

1286 pages. \$16.10. Mic 57-2712

**THE DETERMINATION OF STRUCTURAL PATTERN IN
A POPULATION OF COMPARABLE GOVERNMENTAL
OR DEMOGRAPHIC UNITS**

(Publication No. 21,680)

Frank Alexander Yett, Ed.D.
University of California at Los Angeles, 1957

The problems of governmental finance have been the motivation for extensive analytical treatment of the likenesses and differences among comparable governmental or demographic units. This study is concerned with investigating a general method by which those likenesses and differences can be quantitatively determined. The study includes a critique of indexing methods developed in the past fifty years which might be useful in the field of public finance. The analysis includes discussion of methods used for making quantitative comparisons which have been used in fields other than public finance. An explanation is given as to how this analysis has led to the development of the method of evaluation presented in this study.

The general method developed in this study may be divided into three parts:

1) Collection of data taken from state and federal census publications and the reports and findings of authorized public agencies, and the design of a sample of variables expressed as index ratios or fractions.

2) Determination of basic interrelationships existing in the total description of the population as evidenced by the sample of variables.

3) Quantification of the concept, structural pattern, through the design of linear functions of variance expressing the relative contribution of each variable to the major modes of variation.

The computations and analyses in this study were so massive as to require the use of a high-speed electronic digital computer. The machine used was the computer known as SWAC, which is located on the U.C.L.A. campus at the Numerical Institute for Analysis.

The functions of variation are refined statistically until the quantitative distributions given the population by the functions show substantially no correlation. The orthogonal functions so derived are termed, *principal dimensions*. The family of principal dimensions is called a *structural pattern* of the population. The sets of scores assigned to the population by the principal dimensions are the quantified expression of that structural pattern.

Application of the method to an experimental population, the 58 counties of California, demonstrated that the method derives a structural pattern which gives both 1) a qualitative description of the population which groups counties with similar characteristics and identifies "isolates," and 2) a quantitative ranking to the counties on the major characteristics. The structural pattern scores given the population account mathematically for the likenesses and differences which exist.

These findings have important implications if one of the principal dimensions of the pattern can be accepted as a criterion of some major characteristic. It means that both general qualitative and specific quantitative descriptions of the population have been made directly available. A great mass of unorganized data is translated into more compact, usable form which does not distort the description given the counties by the original data. At the expense of some detail, a more understandable comparison is available for the areas involved. The derived data, moreover, are in directly comparable form.

The application of the method has demonstrated that the method can be useful in studies where the characteristics of political units or demographic areas are of interest.

352 pages. \$4.50. Mic 57-2713

ECONOMICS, HISTORY

A CASE STUDY OF THE GOVERNMENT'S ROLE IN ECONOMIC DEVELOPMENT IN THE EIGHTEENTH CENTURY: THE BRNO FINE-CLOTH FACTORY

(Publication No. 21,786)

Herman Freudenberger, Ph.D.
Columbia University, 1957

A basic problem for the Habsburg Monarchy in the second half of the eighteenth century was the development of a native industry. In this relatively backward country, the task of stimulating and encouraging the expansion of industry fell to the government. This was especially true when a new industry was to be formed.

A case in point is the attempt to create a fine-cloth industry, that is, to manufacture at home an article pre-

viously imported from abroad. For this purpose skilled artisans who were to act as teachers were imported from the fine-cloth manufacturing town of Verviers (in modern Belgium).

After an unsuccessful attempt to teach the guild masters of Jihlava, the Moravian woolen cloth producing center, the Verviers artisans were placed in the village Kladruba of the imperial estate Pardubice (Bohemia). There they operated from 1751 to 1763 in a consolidated workshop under the direction of a Verviers master, one William Joseph Bailloux. Though it was free of guild interference, other problems plagued the enterprise, notably poor management, lack of cooperation from the manorial officials, poor sales, and a product of poor quality.

In 1764 therefore the enterprise was transferred to the Moravian town of Brno--then a town of 15,000 and today a city of 280,000. The Moravian Loan Bank, an institution established in 1751, took over the management under a government charter. Little progress was made and the factory went into new hands in 1767, when John Leopold Koeffiller, a young Brno merchant, acquired the charter. In 1768 he was joined by five other Brno merchants who had begun a fine-cloth factory of their own and who now merged their enterprise with Koeffiller's.

The firm was, however, still not strong enough to maintain an independent existence. It had to be supported continuously by the government to prevent complete failure. But in 1772 a new manager was hired, one Bartholomew Seitter, a man trained in the woolen cloth center Montjoie (modern Belgium). Under his guidance the factory grew into a sizable enterprise, which, in 1780, employed over 700 workers and operated 45 looms.

During that year, Koeffiller, the only partner remaining from the six Brno merchants who had banded together in 1768, negotiated a new charter at the expiration of which, in 1792, the firm was to have severed all its direct connections with the government. Unfortunately, in 1789, the firm went bankrupt. Various factors, including malfeasance of factory officials, lack of financial resources, and the closure of the most profitable market of the factory, Turkey, caused the firm's demise. As far as the economy of the Habsburg Monarchy was concerned, the firm had accomplished its purpose: a fine-cloth industry had been founded. Brno became the capital of this industry and prospered greatly in the nineteenth century.

376 pages. \$4.80. Mic 57-2714

THE BUSINESS OUTLOOK IN THE NORTHERN COLONIES, 1750-1775

(Publication No. 21,821)

William S. Sachs, Ph.D.
Columbia University, 1957

The years after King George's War were not encouraging ones for merchants. The first signs of reaction came in 1749 with a slump in sales of British wares. Soon thereafter trade depression spread to other lines. New England in particular was hard hit that year as drought and unstable currency conditions brought further strain on commercial operations. For the next several

years merchants in all Northern colonies complained of dull trade, especially of low profit margins, slow-moving inventories, and tight money markets.

The outbreak of war between England and France in 1756 altered this situation. Colonial merchants found business booming during wartime, and until 1760 at least saw nothing in sight to change it. They discovered newly-opened opportunities created by war, such as underwriting marine insurance, supplying military needs, and filling the abnormal demands for commodities and freighting in the West Indies. Large governmental outlays, both British and colonial, provided a ready means of financing the war boom.

Despite a sharp setback in the fall of 1760, merchants emerged from the war with high hopes of prosperous years ahead. But these expectations did not materialize. The period immediately following the Peace of Paris was marked by a severe recession. At the same time, the British government imposed additional taxes and more exacting regulations on colonial commerce. Though Parliament in 1766 modified the measures which constituted the major colonial grievances, merchants characterized trade as sluggish up until 1770. Again in 1772 a sharp business downturn occurred in America, following the London banking crisis in the summer of that year.

Merchants assessed business conditions almost entirely in terms of short-run factors, such as prices, exchange rates, sales, commodity flows, monetary conditions, etc. Colonial merchants placed their emphasis upon the present. They formulated their basic business policies with an eye to the immediate future, and not with a view toward long-range benefits. On the whole, they adhered to the dictum of selling while the selling was good.

But in their analyses of causal relationships, merchants gave prominence to elements inherent in the business structure. Excessive competition and uncontrolled credit were singled out most frequently as factors responsible for many of the commercial difficulties.

During the prolonged period of bad times in the 1760's merchants embarked upon programs of concerted action, aimed at relieving some of the obvious business ailments. These programs were highly varied in nature, encompassing a host of diverse activities. Merchants called for manipulation of the monetary mechanism. Proposals for issuing paper money in times of stress represented the most widely-supported program for using monetary devices to counteract the effects of trade depression. Another line of approach resulted in attempts to curtail excessive competition. By establishing cartels, merchants in the iron, candle and sugar refining industries sought to substitute competitive practices with a planned system calculated to produce mutual benefits. Restrictive measures against itinerant trading and vendue sales were also attempts to restrict the severe effects of competition. A third course of action involved a concerted movement for developing manufactures suitable for British markets.

The greatest success was probably registered in the development of manufactures. But even the objectives of this movement were only partially attained. In fact, the entire program of combatting trade depression was of limited scope, and remedial rather than preventive. Considering the fact that economic and political control rested mainly in Great Britain, colonial businessmen may have made the most of the opportunities which lay within their range of probability.

330 pages. \$4.25. Mic 57-2715

ECONOMICS, THEORY

A STUDY OF PERSONAL INCOME DISTRIBUTION

(Publication No. 22,059)

Jacob Mincer, Ph.D.
Columbia University, 1957

The present study is an attempt to explore empirical regularities in personal income distributions as analytical consequences of individual differences in investment in human capital, that is in training and experience.

The following empirical regularities were identified and investigated: (a) Positive skewness in aggregative income distributions; (b) Increasing income inequality with age in age decompositions of the aggregate and of specific occupation groups; (c) Increasing income inequality with educational and occupational level in corresponding decompositions of the aggregate; (d) Increasing income levels and inequality with city size; (e) Systematic differences in inequality among groups classified by industry, color, sex, and family status.

Far from being a complete explanation of the above phenomena, the analysis of investment in human capital provides a unified interpretation of all these, at first glance unrelated features of personal income distributions.

The implications for income distributions of individual differences in investment in human capital are derived in a theoretical model where the process of investment is subject to free choice - broadly speaking, occupational choice - refers to training differing primarily in length of time it requires. Since the time spent in training constitutes a postponement of earnings to a later age, the assumption of rational choice means an equalization of present values of life-earnings at the time the occupational choice is made. This equalization implies higher annual pay in occupations which require more training.

The interesting theoretical result is that inter-occupational differentials turn out to be a simple function of differences in training: absolute differences in length of training result in percentage differences in annual earnings. It follows that as long as the distribution of training is not skewed negatively, the distribution of earnings must be positively skewed.

Intra-occupational differences arise when the concept of investment in human capital is extended to include experience on the job, in addition to training before entering the job. Age measures both the process of acquiring experience and biological growth and decline. The growth of experience, hence of productivity, reflects itself in increasing earnings with age, up to a point when biological decline begins to affect productivity adversely. The important difference among occupational groups is that, on the whole, increases in productivity with age are more pronounced and declines less pronounced in jobs requiring greater amounts of training.

When the positive relation between investment in human capital and growth of productivity is incorporated in the theoretical model, the following results are produced: First, inter-occupational differences increase, because the present value of a given size life-flow of income is smaller the steeper the positive slope and the later the peak of the age-income curve. Secondly, because of the increasing age gradient of earnings, intra-occupational dispersion must increase with occupational level. In

other words, occupational groupings ranked by the amount of training they require exhibit a positive correlation between income levels and income dispersion. Moreover, the increasing, with age, divergence of life-paths of earnings among different occupations implies that inequality in age groups increases with age.

Finally, any decomposition of the aggregate by criteria

other than age, education, and occupation produces groups which constitute training - and age - "mixes". The previous conclusions imply that income dispersion in such groups must be positively related to an average amount of investment in human capital in them. Breakdowns of income recipients by industry, color, sex, and city size were analyzed in these terms. 163 pages. \$2.15. Mic 57-2716

EDUCATION

EDUCATION, GENERAL

A COMPARISON OF OVER-ACHIEVING AND UNDER-ACHIEVING STUDENTS AT THE UNIVERSITY OF ARKANSAS

(Publication No. 21,952)

Charles L. Diener, Ed.D.
University of Arkansas, 1957

Major Professor: R. K. Bent

This study was an attempt to identify significantly different characteristics in certain areas between over-achieving and under-achieving college students. Used as subject for the study were 74 over-achieving and 64 under-achieving sophomores, juniors, and seniors who had done all previous college work at the University of Arkansas, who had been in continuous regular enrollment since first entry, and who were regularly enrolled for at least a minimum of 14 credit hours in the first semester of 1956-1957 at the University of Arkansas in the Colleges of Arts and Sciences, Business Administration, Education, Engineering, or Agriculture and Home Economics. An over-achieving student was one whose T score for cumulative grade average was 15 or more points above the T score derived from his raw score on the American Council on Education Psychological Examination; and an under-achieving student was one who fell correspondingly below.

These students were studied for differences in scholastic aptitude, cumulative grade average, reading ability, mechanics of expression, high school marks, age, average number of hours spent in a week in studying, extra-curricular activities, and work for pay, class attendance, and place of residence.

The two groups were then divided on the basis of sex, resulting in 45 males and 29 females, over achieving, and in 63 males and one female, under-achieving. The students were then studied for differences not only in those characteristics just mentioned but also for differences on the Brown-Holtzman Survey of Study Habits and Attitudes, the Kuder Vocational Preference Record--Form CH, and the Edwards Personal Preference Schedule.

Findings. For both over-achieving and under-achieving males, there were no differences at the 95 per cent level for age and time spent in extra-curricular activities. Differences which favored both the over-achieving students and males were high school and university marks and time spent at study; those which favored both the

under-achieving students and males were scholastic ability, reading ability, ability in mechanics of expression, and time spent at work for pay. For places of residence dormitory headed the list for both groups of over-achievers, while fraternity house headed the list for both groups of under-achievers. Sufficient data were not available to make a comparison on class attendance nor on females.

For the other comparisons made for over-achieving and under-achieving males, there were no significant differences found for all areas of the Kuder Vocational Preference Record except artistic interest, which favored the under-achievers, and for all areas of the Edwards Personal Preference Schedule except order, which favored the over-achievers. Differences in study habits favored the over-achievers.

Conclusions. Few appreciable differences were found between over-achieving and under-achieving students in the characteristics studied. Noteworthy, however, were better study habits and more order about themselves by the over-achieving males and more vocational artistic interest by the under-achieving males. From the results of this study, those counseling under-achievers can locate areas for helping them to achieve more should they desire to do so.

Recommendations. On the basis of the findings of this study, the following recommendations are made:

1. That research be continued in the very concept of over-achievement and under-achievement to determine if such conditions exist or if they are an artifact of random fluctuation.

2. That, if the present definition of over-achievement and under-achievement--that of equation of scholastic aptitude with predicted or expected academic success--is continued, new constructs of investigation should be attempted, such as a sociological construct or a status concept.

67 pages. \$2.00 Mic 57-2717

ATTITUDES OF COLLEGE WOMEN TOWARD STUDENT ORGANIZATIONS AT THE UNIVERSITY OF OKLAHOMA

(Publication No. 21,886)

Charlyce Ross King, Ed.D.
The University of Oklahoma, 1957

Major Professor: Dr. F. F. Gaither

The problem in this study was to discover the kinds of attitudes and the extent to which these attitudes are similar or different as expressed by undergraduate women students toward student organizations at The University of Oklahoma.

The survey method of research was used, and the source of data was the direct reporting of attitudes by undergraduate women students. The questionnaire technique was used in gathering these data. The Likert method served as a basis for construction and scoring of the Attitude Inventory developed in the study. A fifteen percent stratified sample of the population was used. Stratification was carried out first by college and then by academic classification within the colleges.

Attitudes toward specific organizations and toward organizations in general and the student organization program were determined and measured in the study. Organizations were classified as follows: Governing, Social, Service and University-Wide, and Honorary-Departmental-Other.

Means and standard deviations were calculated for respondents by College, academic classification, and sorority affiliation. Percentile ranks of organizations and the Extent of Agreement Index were used in the analysis of data.

Correlations of attitude scores with grade average, membership in organizations, and the student's estimate of the organizations were determined.

The findings of this study are as follows:

1. The attitudes of the respondents who indicated attitudes toward specific organizations were most favorable toward the Social type organization and were least favorable toward the Governing groups.
2. The college enrolment or academic classification of a student is not related to the kinds of attitudes she holds toward student organizations in general and the student organization program.
3. No significant differences were found between the attitudes of sorority and independent women as these attitudes are expressed toward student organizations in general and the student organization program.
4. Attitudes of the undergraduate women students were most favorable toward the human relationship values and recreational values of student organizations in general, and the least favorable attitudes were expressed toward the leadership values of these organizations.
5. There seems to be no relationship between grade point average and attitude scores or between membership in organizations and attitude scores. Significant correlation was found between attitude scores and the student's estimate of the organizations.
6. Approximately one half, 51%, of the respondents estimated that the present student organizations are good, and 32% rated these organizations as being fair. Twelve

percent said they were excellent, 4% considered them to be poor, and 1% very poor. 202 pages. \$2.65. Mic 57-2718

CHARACTERISTICS AND CITIZENSHIP ACTIVITIES OF GRADUATES OF OHIO NORTHERN UNIVERSITY

(Publication No. 21,919)

Harold Lieberman, D.S.S.
Syracuse University, 1957

Ohio Northern University is an institution where professional education has been markedly emphasized. This study was an attempt to cast some light on the differences in the impact of generalized vs. specialized education, particularly with reference to certain citizenship activities.

This study posed two major questions: In the realm of citizenship activities, how do Ohio Northern graduates compare with United States college graduates? And, within the university, how do the graduates of the Colleges of Liberal Arts, Engineering, Pharmacy, and Law differ from one another?

A questionnaire was sent to every fourth graduate listed in the Ohio Northern alumni files, the final sample being just under fifteen hundred. The questionnaire was constructed along lines suggested by the 1947 study of national college graduates by Time, Inc., thus facilitating comparison of results. Central features of the questionnaire were two scales of civic and political activity (used also in the Time study) which were designed to include many of the generally agreed-upon elements of good citizenship in these two areas.

Responses to the questionnaire and to a follow-up post card totaled 51.5% of the original sample. Comparison of the return and non-return samples, as well as the early vs. the follow-up returns, indicated that the returns were generally representative of the entire sample.

The major conclusions of the study are as follows.

1. Although United States graduates rank well ahead of Ohio Northern graduates in extra-curricular activity during college, there are few substantial differences between them when it comes to present-day citizenship activities. Only Ohio Northern pharmacy graduates fail to keep pace with their national counterparts.
2. The pattern of campus activity is closely related to the pattern of post-college activity, regardless of college of graduation.
3. Law and liberal arts graduates rank well ahead of engineering and pharmacy graduates in level of citizenship activity. In the case of the law and engineering graduates, the influence of the occupational role seems to be considerable.
4. With the exception of sex and possibly occupation, the background factors dealt with in this study--residence, college attendance of parents, family patterns, income, working hours, leisure time, etc.--do not account for the differences in citizenship activity between the graduates of the four colleges.
5. Both national and Ohio Northern graduates tend to engage in those citizenship activities which involve little effort or responsibility and to avoid or neglect those which are more demanding.
6. Other things being equal, United States and Ohio

Northern graduates whose college education tended to be generalized are likely to maintain a higher level of citizenship activity than are those graduates whose college education was specialized.

Perhaps the major question remaining unanswered concerns the role of psychological processes in campus and citizenship activity. Do people with a general education tend to become more active because of that education? Or do people with predispositions toward activity tend to choose a general education in college?

In any event, it seems clear that the generally-educated are more active in civic and political affairs than the specially-educated. 185 pages. \$2.45. Mic 57-2719

AN EVALUATION OF REQUIREMENTS FOR THE CERTIFICATION OF SECONDARY-SCHOOL TEACHERS

(Publication No. 21,597)

Wilbur DuBose Livingston, Ph.D.
University of South Carolina, 1957

In South Carolina the type of certificate issued to a teacher is determined by three factors, as follows: (1) the amount and kind of education, (2) teaching experience, and (3) total score on the Common Examinations of the National Teacher Examinations. During the 1955-1956 school year there were 6,790 secondary-school teachers who taught in South Carolina. The purposes of the present study were (1) to determine from the files of the State Department of Education whether or not those teachers selected by their individual principals as being most excellent on the basis of overall performance are also most excellent on the basis of the types of certificates issued to them, as compared to the types of certificates issued to all of the 6,790 secondary teachers of the State and (2) to evaluate, on the basis of the opinions of those selected secondary teachers who participated in the study, the typical requirements in the United States for the certification of secondary teachers, the most prevalent deviations from these typical requirements, and the requirements for the certification of secondary teachers in South Carolina.

From these typical requirements and deviations, which were determined by a study of certification requirements of the forty-eight states and the District of Columbia, and from South Carolina's requirements, an opinionnaire of eighty-two questions was formed. Each high-school principal in the State was asked to select the 20 per cent of his teachers whom he considered most excellent on the sole basis of overall performance. Opinionnaires were sent to those of the selected teachers who agreed to participate in the study. A total of 955 completed and returned their opinionnaires, which were tabulated according to the race, sex, age, and type of certificate of each participating teacher. These tabulations were used as a basis for the evaluations.

The general conclusions from the study were as follows:

1. As a group, the secondary teachers selected as most excellent, as compared to all of South Carolina's secondary teachers, had more education, had more teaching experience, and made better scores on the Common Examinations of the National Teacher Examinations.

Consequently, there is some indication that South Carolina's present policy of issuing different types of certificates on the basis of these three factors is justified.

2. As a group, the participating teachers feel that the majority of the typical requirements for the certification of secondary teachers in the nation are at least acceptable. They disapprove only two of the twenty-one typical requirements evaluated and recommend changes in seven.

3. They feel that the majority of the deviations from the typical requirements are not acceptable. They disapprove fifteen of the twenty-seven deviations evaluated and recommend changes in two.

4. They feel that South Carolina's certification program is a good and acceptable one. They disapprove none of the thirty-one of South Carolina's requirements evaluated and recommend changes in only eight. And those recommendations do not represent any changes in the basic structure of the program.

5. The participating teachers do not want certification requirements lowered. They agree that substandard certificates or permits may be necessary when regularly certified teachers are not available; but they do not agree that standards should be lowered to make available for teaching more people who are certified.

6. The participating teachers feel that the teacher-training institutions should have more responsibilities than they now have in the way of selecting, recruiting, training, recommending, and following-up of teachers.

7. And, finally, the participating teachers feel that certification requirements for secondary teachers should be cooperatively studied periodically and that appropriate changes should be made. 326 pages. \$4.20. Mic 57-2720

LEGISLATIVE CONTROLS OVER THE PUBLIC SCHOOL CURRICULUM

(Publication No. 21,888)

Major L. McClure, Ed.D.
The University of Oklahoma, 1957

Major Professor: Gail Shannon

This study is concerned with: (1) giving a brief and general history of legislative controls over the curriculum of the public schools, (2) investigating the existing legislative controls over the curriculum of the public schools, and (3) indicating some trends in both the number of laws and the subjects which they control or regulate along with a comparison of the number of laws affecting selected subjects at three different periods.

The following findings are based on a review of the current statutes of the forty-eight states, a review of previous studies in this area, and a summary of the comments of various historians.

1. Laws will continue to be enacted controlling certain phases of the curriculum as long as state legislatures are subjected to the pressures of organized groups.

2. The problems which face our society at any particular time form the basis for curriculum laws. Our society attempts to correct its weaknesses by passing laws requiring that its particular problems be taught as subjects in the public schools.

3. The only two subjects to show significant gains in regard to the number of laws controlling them are safety education and English Literature. English Literature has gained three-hundred per cent, but there are still only six states having laws in this area.

4. The number of subjects controlled by laws from the several states has not decreased. There are just as many subjects mentioned now as in 1925.

5. The total number of laws affecting the public school curriculum has decreased by over sixty per cent and if the present trend continues, the effect of legislative enactments relating to the curriculum will be negligible within two decades.

140 pages. \$2.00. Mic 57-2721

YOUTH HOSTELING AS A SCHOOL AND COMMUNITY YOUTH SERVICE PROGRAM

(Publication No. 21,728)

Francis Herbert Oldham, Ed.D.
New York University, 1956

Chairman: Forrest E. Long

The Problem

In the rapid development of sponsored group hosteling, the need for establishing sound practices and policies in health, safety, liability, finances, morals, and disciplinary controls became more and more apparent. Therefore, this investigation became concerned primarily with formulating a manual of approved procedures for hosteling groups by: (1) surveying the present practices and policies, and (2) evaluating by means of a qualified jury those common to the majority of the existing groups.

Origin of the Problem

This problem stemmed from the rapid growth of teenage hosteling programs in community youth service agencies such as the Y.M.C.A., Y.W.C.A., Boy Scouts, Girl Scouts, settlement houses, church young peoples' societies, and schools. The lack of administrative direction and a source of approved policies and practices resulted in these groups using trial-and-error methods to solve crucial problems peculiar to their own operation. A natural by-product of this "hit-and-miss" method of operation was the high attrition rate in group memberships. The impending need for solutions to these problems initiated this study.

Procedure

1. Twenty sponsored youth hosteling groups out of a population of seventy-eight met the established criteria:

- (a) youth service agency sponsorship,
- (b) active hostel programming,
- (c) and operating longevity of one year.

2. From the twenty selected groups representatives of each of six categories became respondents for a questionnaire surveying current practices and policies. The categories represented were:

- a. directors of the sponsoring agencies
- b. A.Y.H. council members
- c. hostel group leaders
- d. house parents

e. parents of hostellers

f. student hostellers

3. Their responses on the questionnaires were tallied. Those hosteling practices and policies indicating by 50.1% or higher agreement that they were common to a majority were presented to a jury of fifteen representatives of national organizations serving youth.

4. This jury evaluated these common practices and policies as sound or unsound.

5. The results of their evaluations plus the materials available in the A.Y.H. administrative files were incorporated into a hosteling manual.

General Conclusions

1. Out of the twenty-three common practices and policies submitted to the jury 83% were agreed by a two-third majority of the jurors to be sound or sound with limitations. The high degree of positive correlation (+.80) in the judgements of the jury selected in random pairs emphasized the unanimity of these judgements.

2. The attempt by the jurors to rank these policies in order of their importance in youth work resulted in such low correlations that the rankings were disregarded.

3. In evaluating the current group hosteling practices and policies the jurors reached two-third agreement on the following common policies as sound or sound with limitations:

- a. the development of effective citizenship
- b. reduction of economic, religious and racial barriers
- c. democratic living experiences
- d. consumer education experiences
- e. reduction of road hazards
- f. provision of or individual trip insurance
- g. financing of trips by individuals

4. Certain current practices in group hosteling were agreed to be unsound. Those included:

- (a) inadequate health, safety, and first aid programs,
- (b) inadequate chaperonage on "co-ed" trips,
- (c) undemocratic, trip planning,
- (d) inadequate legal and financial policies,
- (e) and insufficient pre-trip, physical examinations.

5. The findings indicated that group hosteling supplemented classroom instruction in self discipline, effective citizenship, democratic living, consumer education, and racial, religious, and economic socialization.

6. The integration of hosteling with academic subjects in the school curriculum was not recommended.

7. Local autonomy, decentralization, and dual administration allegiance created capricious organization and operation in hosteling groups.

These findings were incorporated in a hosteling manual in which the evaluated policies and practices were supplemented by techniques and procedures suggested by the respondents, interviewees, and the literature.

196 pages. \$2.55. Mic 57-2722

HISTORICAL AND CURRENT ISSUES IN RACIAL INTEGRATION IN THE PUBLIC SCHOOLS OF ARKANSAS

(Publication No. 21,955)

Jack Quentin Reynolds, Ed.D.
University of Arkansas, 1957

Major Professor: R. K. Bent

This study sought to state and evaluate the historical and current issues in racial integration in the public schools of Arkansas, and to determine how Arkansas educators stood on the current issues. It was believed that in this way a comprehensive definition of the problem might be secured.

Sources of data included legislative and judicial records; books on history, education, psychology and sociology; and questionnaires given to school administrators and teachers.

A section of the study was devoted to presenting in chronological order an outline of significant events in the development of racial relations problems and public education. The body of the study was given to the statement, classification, and evaluation of the current issues, including the opinions of Arkansas educators concerning them. Issues were classified into governmental, religious, moral, sociological, psychological and educational philosophical groups. A short discussion of trends and problems was included.

Findings. Problems in racial relations began early in the history of America and became closely associated with governmental, religious, moral, social and economic problems. Early Americans did not face their problems squarely, but made them more complex by their illogical compromises. The resulting emotional bitterness reached a climax in the Civil War, but this did not settle all the questions. Conduct of the Reconstruction renewed inter-sectional and interracial feelings that have persisted to the present time. Arkansas schools, having squandered their heritage of permanent school funds, were in a bad plight after the Civil War, but provision for public support was established. The Freedmen's Bureau established Negro schools which later became a part of the state school system, but because of legislation, court decisions, and tradition they remained separate from the white schools. Equality of the Negro schools was not maintained.

Present issues in desegregation include logical questions growing out of practical situations; revivals of ante bellum slavery issues concerning racial differences and the morality of segregation; and a great many others representing attempts to rationalize the reconcile the first two groups. Self-interest groups exploiting prejudices include politicians and industrial management. Church bodies, though willing to follow their recognized sources of authority on minutest matters of doctrine, are inconsistent in their attitudes toward racial segregation. Arkansas educators appeared to be more liberal than the general public in the racial attitudes, and white men seemed to be less prejudiced than white women. No difference was found between Negro men and women in their attitudes, but there were significant differences between whites and Negroes in their opinions on current racial issues. Patterns of contradictions in both attitudes and behavior were found throughout the problem.

Conclusions: The racial problem, having existed so

long and having become intertwined with problems in every other phase of American life, is highly complex, full of contradictions and charged with emotion. Although some of the issues are logical and practical, many others cannot be resolved by merely providing more information. Arkansas educators are faced with the greatest test of their professional capacities and the challenge of this generation.

Recommendations. More information should be provided in all fields concerned with racial and educational problems, and the trend to interdisciplinary and inter-institutional cooperation should be encouraged and continued. Since many of the problems do not have a logical basis, studies on emotional development, attitudes, and the nature of prejudice are needed. Work needs to be done on ways to implement integration. This is needed in the fields of school administration, instruction, and activities. Studies of the needs of Negro youth would be timely and useful. All kinds of research could be adapted to the study of desegregation.

189 pages. \$2.50. Mic 57-2723

THE DEVELOPMENT OF PROCEDURES FOR THE EVALUATION OF EDUCATIONAL METHODS USED IN ACCIDENT PREVENTION

(Publication No. 21,618)

Robert James Schreiber, Ph.D.
Columbia University, 1957

Much of the accident prevention activity in this country is of an educational type, directed at influencing human behavior rather than changing the physical environment. Included in this activity are a variety of media and methods including films, speeches, meetings, etc. To date, the only measure of effectiveness of these techniques has been the opinion of users, and among them there has been considerable disagreement.

The purpose of this research is to develop criteria of the effectiveness of the educational safety methods, to develop procedures of measurement and inference, and to test these methods by application.

The use of accident frequency or accident rate as a measure of effectiveness of a particular prevention activity (e.g., a film) is rejected because the relative infrequency of accidents restricts inferences of effectiveness to those prevention activities whose effects are so large as to be unlikely. It is concluded that the only useful criterion is change in accident provoking behavior generated by the accident prevention activity.

The measurement of such change must be dictated by a method of analysis which will permit inferences to be made with known degrees of confidence. An examination of the classes of experimental design and analysis reveals that neither the before-and-after or the control-group methods satisfy the requirements for this application. Accordingly, it is found that statistical control procedures, analyses, and inferences best fit the needs of this situation provided the conceptual framework is modified according to need. The method indicates the general nature of data collection procedures, the method of detecting changes in behavior, and the likelihood of false signals and lack of signals.

The experimental determination of which behaviors are accident provoking was too costly at this time. Therefore, those acts which are most often found to be the "unsafe acts" in accident reports were chosen. The measure of their incidence is the proportion of persons who are engaged in one or more of these acts at any given time. Methods are developed for estimating the first two moments of the distribution of these proportions in three kinds of situations: (1) where unsafe acts are dichotomies and only one sample proportion can be observed at a time, (2) where unsafe acts are dichotomies and several successive (and equal size) samples can be observed, and (3) where the unsafe act may be measured on a continuum and the datum for each person can be known.

Several applications in each situation were made with the intent of determining the amount of change in unsafe behavior coincident with any safety (or other) activity. The proportions observed illustrated phenomena which inhibited inference based on theoretical statistical models. Therefore, inferential procedures were modified to exclude short lived changes in behavior which differed from the theoretical expectation. It was found that many kinds of events (e.g., holidays) affected unsafe behavior. The inferential procedures play a major role in the methodology developed, and it is indicated that if measurement is to replace opinion in the evaluation of types of safety education, these inferences must be based on reasoned conceptual considerations. 122 pages. \$2.00. Mic 57-2724

**AN EXPERIMENTAL STUDY TO DETERMINE THE
EFFECTIVENESS OF THE FRESHMAN
ORIENTATION LECTURES AT THE
ARKANSAS STATE TEACHERS COLLEGE**

(Publication No. 19,283)

James Andrew Sylar, Ed.D.
Indiana University, 1956

This study constituted a twofold attempt: (1) To identify the problem areas and the specific problems of a group of entering college freshmen as indicated by The Mooney Problem Check List, College Form, and (2) To evaluate the effectiveness of the freshman orientation lectures in reducing or lessening the severity of these problems.

Justification for a study of this kind was found in the fact that there was considerable questioning by administration and staff as to the effectiveness of the freshman orientation lectures.

An examination of the relevant professional literature indicated that no study had been completed which revealed in somewhat definite terms how the personal, social, and academic problems of freshmen were ascertained and what personnel workers and staff members were doing to help students identify and solve these problems.

All entering freshmen were administered The Mooney Problem Check List, College Form, two times, once before and again after the orientation lectures. The participating students were divided into two groups of equal size and designated as control and experimental. The experimental group attended the orientation lectures; the control group did not attend. The study was carried on for a

period of eighteen weeks and consisted of three phases: (1) orientation and testing; (2) instructor's lectures; and (3) re-testing.

Both the control and the experimental groups took part in the first and third phases of the study, each of which lasted one session of fifty minutes. Only members of the experimental group participated in the second phase.

The responses on both administrations of the Check List were analyzed in terms of the following categories for both men and women in both control and experimental groups: (1) total number of problem areas of concern; (2) total number of problem areas of most concern; (3) specific problems of concern to at least 10 per cent; and (4) specific problems of most concern to at least eight per cent.

Chi-square tests were used to show that there was no difference between the two groups. To verify the homogeneity of the two groups a t-test was computed, and to test for differences in responses between the two groups to the Check List an analysis of covariance was used.

An analysis of the data presented revealed certain findings and conclusions:

1. Both men and women in the experimental group showed greater percentages of reduction in specific problems after having attended the orientation lectures than did members of the control group.
2. Women expressed more problems than men.
3. There were no significant differences in the mean ages and the mean ACE scores of the two groups.
4. There were no significant differences between the distributions of married and unmarried subjects, ages, and ACE scores of the subjects in the two groups.
5. Both men and women indicated more problems in the general area of academic adjustment than in any other area measured.

Certain conclusions were drawn from the findings in this study. They are as follows:

1. Although not statistically significant at the five per cent level of significance, specific problems in all of the 11 areas included on the Check List can be reduced to some extent by a well planned series of orientation lectures presented by a competent and well trained personnel staff.
2. Although the differences between the control and experimental groups were not statistically significant, the students in the experimental group showed a noticeable decline in problems of most concern in Area IX, Adjustment to College Work.
3. An approved syllabus should be followed, attendance required for all entering freshmen, and credit be given for attending the freshmen orientation lectures.
4. Both men and women were more interested in the problems in areas relating to personal and social adjustment than in areas relating to religion, philosophy, and heterosexual relationships.
5. The total problems of concern and of most concern to the men and the women in the control and the experimental groups had reference to problems in the area of academic adjustment which seemed to be of concern more frequently than any other problem area.
6. Entering college freshmen are aware of their deficiencies in scholastic training as indicated by the number of responses in this area on the Check List.

162 pages. \$2.15. Mic 57-2725

RELATIONSHIP OF MENARCHE TO ACHIEVED GROWTH IN HEIGHT

(Publication No. 20,088)

Ekanem (Benson) Akpan Udoh, Ph.D.
Michigan State University, 1955

The purpose of this study was to discover the relationship existing between the menarche and the achieved growth in height of adolescent girls. Much work has been done in the field of biology and human growth in an attempt to relate the menarche to other phases of development including the height; but the results have been narrative rather than specific and conclusive. It was believed that the desired relationship could be ascertained by using a developmental approach involved in the data of physical measurements collected periodically on a large number of the same individuals, from early life through pubescence.

The longitudinal height and menarcheal records of two hundred sixty-three cases of the original Harvard Growth Study were obtained from the Child Development Laboratory of the Bureau of Research and Service, College of Education, Michigan State University. Using the Courtis Technique, Gompertz equations were calculated from the individual data. The age at menarche was substituted for time in each equation, and the achieved growth in height at menarche was obtained for the preadolescent, adolescent, and total development. Thus the percentages of growth on each of these phases of development were obtained along with the constants--maximum, rate, and incipency, of these equations. These values were then analyzed and compared statistically.

The results showed that the mean age at which the menarche occurred was 13.06 years. Menarche was also found to occur when the adolescent girls have reached approximately 94.45 percent of their individual total development. The percentage of development at menarche in the preadolescent phase of growth was 96.56. It was found to be 75.95 percent on the adolescent phase of height development.

On the basis of the ranges of percentages, the total development phase was considered the most logical one on which to base the findings, whereas, that of the preadolescent cycle was considered of more predictive value. The adolescent cycle was found to have very little or no predictive value on the same basis.

A low but positive correlation of 0.384 was found between the ages and the percentage of total development. Therefore, the age at which menarche occurred was found to have no significant relation to the percentage of height development at menarche.

The maximum height to which the individuals grew, the incipencies from, and the rates at which height development on each cycle began to grow were not found to vary with the varying ages at which the menarche occurred.

Menarche was found to occur most frequently in the fall and least frequently in the winter among the cases.

A tendency for measures taken about a year before and after menarche to show a spurt and a drop about the growth curve before and after menarche, respectively, was generally evident among the group.

Whenever this tendency was very marked in a case, it was found to be related to a low percentage of adolescent development in height. 151 pages. \$2.00. Mic 57-2726

EDUCATION, ADMINISTRATION

THE FERNDALE SCHOOL-COMMUNITY CONTROVERSY —A CASE STUDY OF THE RESOLUTION OF SCHOOL-COMMUNITY TENSIONS

(Publication No. 20,908)

Lawrence F. Read, Ed.D.
Wayne State University, 1957

Adviser: G.W. Boicourt

This dissertation is a case study of the school-community-controversy which occurred in Ferndale, Michigan, during the years 1951-1953. The study was undertaken for the purpose of evoking some insights concerning the nature and resolution of this unique school-community controversy which might be applied to the study of controversies of a similar nature.

For the purpose of providing a national frame of reference, the study first deals with the national controversy about education. The national critics of American public education are identified and their criticisms are analyzed. This analysis is summarized in the following seven basic indictments of the public school program in the United States:

1. Public school curricula are based on John Dewey's philosophy of pragmatism (progressive education).
2. Public schools are neglecting the fundamental skills.
3. Public schools are partners in a conspiracy to build a collectivist society in the United States.
4. Public schools are dominated by Professors of Education who are determined to impose autocratically their philosophy upon public education.
5. Public schools are not developing proper student attitudes.
6. Public schools have lowered their standards too much in trying to educate all children.
7. Public schools are godless.

The second step in the development of this study is a sociological and historical description of the school district of the city of Ferndale to familiarize the reader with the local frame of reference for this study.

The school-community controversy is dealt with in two steps. First, the historical antecedents of the controversy are traced; and second, the principal events of the controversy are described with an emphasis on the dichotomous division which developed in the community as a result of this controversy.

In Chapter VI, the data of the study are analyzed for the purpose of evoking some insights about this controversy. This analysis deals with the uniqueness of this controversy, its cause, its major issues, the factors which led to its resolution, and its effect on the community.

The final step in this study is the presentation of the following seven hypotheses about school-community controversies which might serve as the bases of further experimental studies in this field:

1. There are negative forces in every school district which constitute a nucleus for a school-opposition movement.
2. The negative forces in a school district tend to remain disunited until they are provided with specific and dramatic issues upon which they can agree.
3. The encouragement in a local school district of

certain educational practices which have been identified by the national critics of American public education as being "progressive" may provide the issues which will unify these negative forces and bring them additional public support.

4. The National emotional climate at any given time may intensify these issues and stimulate a school-community controversy in a local school district.

5. The best single method for protecting a school district from becoming dominated by these forces of negativism is through the total use of citizens' groups for the purpose of helping to formulate school policy.

6. The objective attitude of the school administration toward all of the groups in the community will enhance the position of the positive elements in the community.

7. If the positive forces in a school district adhere to a reasonable, unemotional, and intelligent discussion of the basic issues in an educational dispute, the negative elements in that district will be less likely to attain permanent control of the educational program.

353 pages. \$4.55. Mic 57-2727

A STUDY OF THE EDUCATION OF THE YOUNG AND ADULT BLIND IN ARKANSAS WITH RECOMMENDATIONS FOR AN IMPROVED PROGRAM

(Publication No. 21,956)

Bob Cowley Riley, Ed.D.
University of Arkansas, 1957

Major Professor: Roy B. Allen

Purposes of the study. The examination of existing conditions and practices in the education of the young and adult blind, and their possible improvement under the leadership of an expanded Vocational Rehabilitation Service was the main purpose of the study. The study also sought the following objectives:

1. To describe in lucid and succinct language the inadequacies of the current program and prescribe alternative procedures for improvement.

2. Present an overview of the world of the blind and its inherent problems which the public must comprehend before the educational methods necessary to meet them can be devised.

3. Acquaint those in a position to affect the education of the blind with the full measure of their responsibility to this often misunderstood segment of society.

4. State specific objectives necessary for program improvement and recommendations for their attainment.

Procedure. The frame of reference necessary for an understanding of the myriad problems imposed in the education of the blind developed from the observation of the institutions and agencies responsible for providing those services. The observations produced an immediate necessity and desire for a perusal of literature which should be relevant to the study. The literature revealed a plethora of chimerical pronouncements, the great bulk of which were of little value. The greatest portion of data for the study was obtained through the examination of official statements, records, and reports of the institutions and

agencies providing educational services for the blind, and through personal interviews with their administrators.

Summary. The misconceptions manifest in the attitude of the public, the family, and even of the blind themselves have shown little disposition to amelioration, and their correction should have a high priority in community education.

An evaluation of the systems and techniques of educating the blind, and the milieu from which they emerge, presents several salient ponderables.

1. There are 1.98 blind persons per thousand population. The prevalence rate is rising with the increase of blindness striking after maturity. Three-fourths of the blind population is sixty-five years or older. Glaucoma and cataract are the bane of the aged group, while the insidious retrolental fibroplasia is of most immediate concern as a cause of blindness among infants.

2. The education of the young blind is preponderantly vested in the residential school, which attempts to provide social adjustment and orientation in an environment segregated from society. This task, complicated by inadequate counseling of the parents of the preschool blind child, might be alleviated by the adoption of cooperative classes in the public schools. The residential schools, however, are confident that their special methods and equipment provide the blind student the most satisfactory adjustment academically, vocationally, and socially.

3. The education of the adult blind which seeks adjustment and employability as its ultimate objective might best be begun in a rehabilitation center. Job tryouts and on-the-job training should be stressed. For those who cannot compete with the seeing, the "sheltered workshop" is the only answer.

4. In view of recent developments, the successful attainment of educational opportunities for the blind can best be obtained under the influence and leadership of the Vocational Rehabilitation Service. Through its more prolific source of funds and utilization of trained personnel, a cooperative program for the education of the young and adult blind involving all agencies and institutions responsible for it may be imaginatively constructed and realized.

Recommendations. The Arkansas Vocational Rehabilitation Service should have State funds sufficient to claim Federal matching funds to permit it to fulfill its expanded role.

The Arkansas School for the Blind should be redesigned, its funds increased, and its Negro school integrated as soon as possible to make maximum use of human resources.

270 pages. \$3.50. Mic 57-2728

A STUDY OF THE COMMUNITY PARTICIPATION OF INDUSTRIAL EDUCATION TEACHERS OF HOUSTON, TEXAS

(Publication No. 21,735)

Henry Benton Steele, Ed.D.
University of Houston, 1957

This study examined the participation of industrial education teachers in ten specific areas of organized community activities. These areas were (1) professional

education, (2) adult education, (3) religion, (4) patriotic and community betterment, (5) economic, (6) recreation, (7) fraternal orders, (8) welfare, (9) avocational interest, (10) luncheon and benevolent associations.

Panwitt's list of organizations¹ was adapted to local conditions.

A weighted scale of participation in community organizations was devised. Points scored for participation in any one organization were as follows:

- 1 Member, never attend meetings 1 point.
- 2 Member, attend 1/4 of meetings 2 points.
- 3 Member, attend 1/2 of meetings 3 points.
- 4 Member, attend 3/4 of meetings 4 points.
- 5 Member attend all meetings 5 points.
- Z Officer or committee member. 5 points.

The resulting findings were designated as Membership Participation Points, and were utilized to establish the degree of participation in organizational activities.

Ten areas were investigated. Ten organizations were listed in each area. A maximum of 100 Membership Participation Points was possible for each area.

One hundred and fifty questionnaires were mailed. One hundred and ten were returned for a response of 73.3 per cent.

Group ratings of all responding teachers by degree of community activity were secured from the directors of the departments of industrial education. The identities of the individuals rated were concealed.

Backgrounds were surveyed concerning the size of community in which formative years were spent, college attended, and marital status.

Several studies of large geographic areas indicate not over four per cent of the population of many areas are members of over eleven organizations, while 51.8 per cent of the Houston teachers reported membership in eleven or more. The areas of the highest degree of participation reported were: professional education, religious, and adult education organizations. Teachers averaged one membership in each of the other fields, while administrators averaged membership in two or more organizations in each of the other seven areas of community concern.

Ninety-three per cent of all respondents were married. Sixty per cent were born on farms, or in rural areas with populations less than twenty-five hundred. Seventy-five per cent of those remaining in Houston five years were trained in state operated colleges.

Those who traveled the shortest distance from their homes to their nearest state teachers' college, or Agricultural and Mechanical College, and who moved the shortest distances from college to Houston tended to stay in excess of five years. Minimal moving is their preference.

Teachers evaluated as superior by department directors were found to have a moderate, or middle range, Membership Participation Point score. Evaluation ratings declined in relation to low membership participation and also for those reporting high membership participation.

The factors of age, nativity area, and size of town in which reared were found to have the strongest relationship with extent of membership and degree of participation, being respectively 40-45 years of age, East Texas, and rural communities.

The same factors were found to be strongly related to supervisory ratings, which is consistent with the relationship found between Membership Participation Point scores and supervisory ratings. 218 pages. \$2.85. Mic 57-2729

1. Catherine Panwitt, "Sizing Up Your Community Groups," *Adult Leadership*, Vol. 1, No. 5 (October, 1952), pp. 13-17.

EDUCATION, ADULT

THE IDENTIFICATION OF THE NEEDS OF SENIOR CITIZENS AND AN ANALYSIS AND CRITIQUE OF SELECTED PROGRAMS DESIGNED TO MEET THESE NEEDS

(Publication No. 20,599)

Mildred May Reynolds, Ed.D.
Temple University, 1957

The longevity trend, a national concern has progressively increased during the period 1900 to the present. With this change has come the recognition of the problems and needs of those approaching retirement and those in the retirement years.

This investigation was made within the broad field of gerontology, excluding geriatrics. Gerontology embraces all aspects of aging included in the various disciplines: physiological, psychological, and social-economic. The purposes of the study were to identify senior citizen needs within this framework and to make an analysis and critique of existing selected programs designed to meet these needs.

An analysis was made of organizations and agencies that foster senior citizen programs. These organizations of Federal, state, municipal, and community origin have as their primary goal the consideration of longevity problems and senior citizen needs.

Findings

1. From the review of literature and the study of materials received from the several states, essential senior citizen needs were identified within the disciplines of gerontology and include:

- a) Health that stresses prevention.
- b) Nutrition or diet considerations that contribute to health status
- c) Flexible housing suited to individual desires
- d) Living arrangements providing comforts, companionship, and a preferred manner of living
- e) Financial security providing for a continued pattern of living
- f) Counseling and guidance in pre-retirement and retirement years contributing to satisfactory adjustment
- g) Employment for financial, personal, and social values
- h) Leisure time activities: religious, social, recreational, and cultural, and
- i) Educational opportunity and research as recognized by senior citizens and gerontologists

2. Resident and non-resident programs selected for this analysis are representative, highly specialized and unique. These senior citizen programs described in the literature and in published and unpublished materials received in response to inquiries made to State Governors and Public Welfare Councils include

- a) Programs of Federal, State, and Municipal origin,
- and b) Programs of non-governmental origin.

Visits and interviews with sponsors were made in five of the sixteen resident programs analyzed, and interviews only with sponsors of two others. Similarly, of the six non-resident programs analyzed, visits with interviews were made with two, and interviews only with two others.

Criteria for evaluating selected programs according to identified senior citizen needs were developed on the basis of adequacy within each category.

From the analysis and critique of selected programs, it was found that:

- a) Senior citizens prefer warmer sections of the country.
- b) Employment, particularly for those in financial need, takes precedence over climatic preferences.
- c) Needs are met only partially in representative programs analyzed.
- d) Non-resident programs tend to meet their designed purposes.

Needs of senior citizens as identified and analyzed were met to some degree in the programs analyzed. No program met all needs adequately. The residence and non-residence programs vary in purpose, location, function, and degree of adequacy in meeting senior citizen needs.

3. Conclusions that can be drawn from this investigation include:

- a. Research data, though limited, indicate that later years can be productive; education plays an important role in retirement preparation; counseling services lead to adjustments to a new status.
- b. Flexible programs advocated by gerontologists apply particularly to the needs of housing, living arrangements, employment and leisure time activities.
- c. Employment, governed largely by financial need, ranks high among senior citizen needs. Leisure time activities, otherwise, are satisfactory substitutes.
- d. Independence and freedom represent social values that parallel need to be self-supporting.
- e. Needs are interrelated; e.g., nutritional needs are concerned with physiological, psychological, and economic needs as they contribute to satisfactory health status.
- f. Senior citizens are employable and excel in familiar work. Women returning to jobs after the middle years may need training and re-training programs.
- g. Flexible retirement plans are gaining in public favor.

It is evident that further research is needed to study senior citizen needs and their interrelationships. Expanding programs can be considered to have reached adequacy when they provide for essential senior citizen needs. Programs which provide not only for the continued satisfaction of the needs of senior citizens but also for their continued contributions to society must be developed.

187 pages. \$2.45. Mic 57-2730

EDUCATION, HISTORY

GEORGE PEABODY, FOUNDER OF MODERN PHILANTHROPY (VOLUMES ONE - THREE)

(Publication No. 19,758)

Franklin Parker, Ed.D.

George Peabody College for Teachers, 1956

Major Professor: Clifton L. Hall

Through the use of original documents and contemporary accounts this study attempts a thorough biography of George Peabody, a significant figure as a merchant, international financier, and educational philanthropist. From dry goods importing he became a bond broker and merchant banker whose firm in London was one of the roots of the J.P. Morgan Company. As a philanthropist he reached unusual stature, founding libraries, lyceums, museums, model housing projects, and aiding education in the Southern states. His example set a pattern followed by later educational and social benefactors and his influence is sufficient to establish him as the founder of modern philanthropy.

His relatively poor birth and his early responsibility for the support of his family spurred his ambition for wealth. An older merchant took him in as a junior partner in a dry goods importing firm, first in Georgetown, D.C., and later in Baltimore, and fifteen years later Peabody became head of the firm.

Between 1827 and 1837 he made five business trips to Europe, the last as an agent for the state of Maryland to sell its bonds abroad. Remaining in London he came through the Panic of 1837 unscathed, sold Maryland's bonds despite the defaulting of that state and others on their financial obligations, and laid the basis of his fortune by investing his money in American state securities when their value was low. When the states resumed payment on their bonds he reaped both a large monetary return and some fame for having been a public spokesman for the ultimate good faith of the American states.

By 1834 Peabody had gone through the cycle from merchant to banker and had established an American banking firm in London serving Americans. He never married but concentrated on success in business.

After 1851 he emerged socially by lavish entertainment, the cultivation of friendships, favorable publicity, and by making it his purpose to bridge Anglo-American differences. He then entered cautiously into philanthropy; he began to found lyceums and libraries with small gifts, adding more money as they proved fruitful.

In two visits to the United States, one in 1856 to 1857, the second in 1866 to 1867, he set a pattern of making philanthropic gifts to each city where he had labored, founding several Peabody Institutes, endowing libraries, creating Peabody Museums at Harvard, Yale, and Salem, Massachusetts, establishing the Peabody Education Fund for the Southern states after the Civil War, and furthering the work of historical societies. In England he built model housing units for the poor of London.

Many honors came to him as a result of his successful philanthropy: letters of thanks and a priceless miniature from Queen Victoria, resolutions of praise and gold medal from the United States Congress, honorary degrees from

Oxford and Harvard Universities, and the freedom of the City of London.

The last summer of his life was spent in White Sulphur Springs, West Virginia, where his presence was the occasion for an informal conference on education in the South. His death in London evoked further unprecedented honors in England and the United States. What he left behind was an example for later men of wealth. He directly influenced Enoch Pratt and Johns Hopkins in their benefactions. The successful machinery of his gifts showed that philanthropy can be an instrument of social progress. In creating model institutions that set patterns for later educational philanthropic foundations to follow, he was the founder of modern philanthropy. 1239 pages. \$15.60. Mic 57-2731

EDUCATION, PHYSICAL

THE EFFECT OF A PROGRAM OF NEURO-MUSCULAR RE-CONDITIONING ON THE AMOUNT OF ENERGY EXPENDED DURING STANDARDIZED WALKING

(Publication No. 21,710)

Elizabeth Carolina Lane, Ph.D.
New York University, 1957

Chairman: Raymond A. Weiss

The Problem:

The purpose of this study was to determine the effect of a program of neuro-muscular re-conditioning on the amount of energy expended during standardized walking. This investigation involved the determination of the amount of energy expended during walking prior to and following fifteen weeks of neuro-muscular re-conditioning and the change in the amount of energy expended during walking due to a program of training in re-conditioning.

Procedure of the Study:

Basal and exercise metabolism tests were given to sixteen volunteer women students to determine energy expenditure under basal conditions and during walking on the treadmill. The subjects, who were from New York University, were between the ages of seventeen and twenty-three.

The subjects were divided into two groups, experimental and control, which were similar in activity and health habits; body measurements and preexperimental energy cost.

Each subject in the experimental group was given two twenty-minute lessons per week in neuro-muscular re-conditioning for fifteen weeks. The lessons, which involved the use of mental imagery, were given in the lying, sitting and standing position. The subjects in the control group received no instructions.

Results of the Study:

At the beginning of the experiment, the range in energy cost for the standard exercise for the control group was found to be 3.938 liters of oxygen to 5.972 liters of oxygen per square meter body surface. The energy cost of exercise for subjects in the experimental group ranged from 3.726 to 5.791 $1/m^2$ body surface.

The mean energy cost of exercise for the control group was 4.501 $1/m^2$ body surface and 4.686 $1/m^2$ body surface for the experimental group. The difference between the means of energy cost of exercise for the two groups was not statistically significant. Fisher's small sample t-test was used to make the comparison.

The reliability coefficient for the control group was .908 and for the experimental group it was .851. For both groups the r was significant at the one per cent level. Following the training period the range of energy cost for the control group was from 3.946 to 5.984 $1/m^2$ body surface. For the experimental group the range was from 3.679 to 5.244 $1/m^2$ body surface.

The mean energy cost of exercise for the control group and experimental group was 4.514 and 4.491 $1/m^2$ body surface. For this same period, the reliability coefficient for the control group was .952 and for the experimental group it was .888. For both the control and experimental groups the r was significant at the one per cent level.

To determine the significance of changes between the control and experimental groups the analysis on repeated measures and the analysis of covariance were used. The analysis on repeated measures showed no difference between trials or between experimental and control groups in either the pre-instructional or post-instructional tests. The analysis of covariance indicated a significant difference in the mean change for the experimental group which was -.196 (4.18 per cent change from pre-test to post-test). The change for the control group was slight, .014 (.31 per cent change from pre-test to post-test). The amount of change in the experimental group, although small, is significant and indicates a diminished energy cost of exercise.

Conclusion:
A program of neuro-muscular re-conditioning such as was used in this study will produce a slight but significant decrease in the energy cost of standard moderate exercise. A fifteen week period of training in neuro-muscular re-conditioning is sufficient time to bring about a significant decrease in the energy cost of standard moderate exercise. 121 pages. \$2.00. Mic 57-2732

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EDUCATION, PSYCHOLOGY

AN EXPLORATORY STUDY OF THE ACADEMIC ACHIEVEMENT OF ARAB STUDENTS

(Publication No. 21,027)

Laban Linton Ainsworth, Jr., Ph.D.
The University of Texas, 1957

Supervisor: Royal B. Embree, Jr.

This study was made in order to explore the possibility that there exist significant relationships, useful for predictive purposes, between academic achievement and

scores on tests designed to measure certain factors which were thought to be important for the academic success of Arab students. These factors were: ability to understand spoken English, ability to read English, intelligence, and study habits and attitudes. Measures of these factors were, respectively: an Arabic adaptation of Villarreal's Test of the Aural Comprehension of English for Native Speakers of Spanish, the Diagnostic Reading Test, the Culture Free Test of Intelligence, and an Arabic adaptation of the Brown-Holtzman Survey of Study Habits and Attitudes.

Subjects were 50 undergraduate engineering students selected from the 148 Arab students who attended The University of Texas during the Long Session, 1955-1956. Chi squares and tests of significance revealed no significant differences, for 11 factors, between these Arab students and those who did not participate in the study.

Statistical processes used in the analysis of the data were: significance of the difference between means, product-moment correlations, multiple correlations, chi squares, and discriminant analysis. In addition, test items and patterns of test scores were analyzed.

No significant difference was found between the intelligence test scores of those subjects whose academic achievement was high and those whose achievement was low, and intelligence test scores were not found to be significantly related to scores on tests of ability to understand English, or to length of time spent in the United States. A significant relationship was found between length of time spent in the United States and scores on the test of ability to understand spoken English. Test scores revealed no significant difference in ability to understand spoken English between the high and low academic achievement groups, but a positive relationship was found between DRT scores and academic achievement, and there was a significant positive relationship between achievement and scores on the vocabulary section of the DRT. A positive relationship was also found between DRT scores and length of time spent in the United States, but length of stay was not found to be related significantly to academic achievement or to study habits and attitudes. The highest correlation was found between academic achievement and scores on the Survey of Study Habits and Attitudes.

The value of vocabulary tests and inventories of attitudes, for predictive purposes with foreign students, seems to be clearly indicated by this study. Tests of intelligence, however, appear to have little value, probably as the result of two factors: (1) only the more intelligent students survive the selection process and reach this country; (2) a standard American intelligence test would not be valid for foreign students, and the process of constructing a culture-free test eliminates most of the factors known to be related to scholastic success. Tests of ability to understand spoken English, also, do not appear to be of value for the prediction of academic success for foreign students. The fact that the study revealed significant differences, among subjects, in ability to understand spoken English, but that this ability was not related to achievement, seems to mean that after a certain level of proficiency is reached, achievement is not affected by aural comprehension skills.

140 pages. \$2.00. Mic 57-2733

A STUDY OF DROP-OUTS FROM THE PUBLIC SECONDARY SCHOOLS OF OKLAHOMA CITY FOR THE YEAR 1954-1955

(Publication No. 21,877)

Deryle Kenneth Allen, Ed.D.
The University of Oklahoma, 1957

Major Professor: Dr. F. F. Gaither

The failure of our secondary schools to retain youth in school constitutes a serious educational problem. Approximately half of the nation's youth drop from high school before graduation. This study represents an investigation of this problem as it exists in the public secondary schools of Oklahoma City.

Objectives of Study. The objectives of this study were: (1) to ascertain the nature and extent of the problem in Oklahoma City; (2) to determine the family-personal-school characteristics of the drop-outs; (3) to establish how drop-outs differ from pupils continuing in school with respect to family-personal-school characteristics and opinions regarding school.

Scope of Study. Schools included in the study were all secondary schools of the system, excluding colored schools. The subjects included all who withdrew from these schools during the 1954-1955 school year who were classed as drop-outs. A controlled phase of the study included drop-outs from grades nine and eleven with control groups of in-school pupils from these same grades.

Sources of Data. Data were obtained by drop-out reports and reports on in-school pupils submitted by the participating schools, plus data gathered by an opinionnaire.

Findings:

1. Since 1939, 38 per cent of all ninth grade entrants have failed to graduate from grade twelve with their respective classes. In recent years the loss for each ninth grade class has approached one-third.
2. During the 1954-1955 school year, 1,339 pupils withdrew from the schools studied; 649 were classed as drop-outs.
3. The greatest incidence of withdrawal was at grade ten. Boys comprised 54 per cent of the total withdrawal group.
4. Most common reasons given for withdrawal, in order of frequency, were: for boys, (1) leaving state, (2) non-attendance, (3) entrance into armed forces, and (4) hardship; for girls, (1) leaving state, (2) marriage, (3) illness, and (4) hardship.
5. Forty-four per cent of the drop-outs were not living with both parents.
6. The fathers of two-thirds of the drop-outs were employed in skilled, semi-skilled and unskilled occupations.
7. Drop-outs were from families having an average of 3.5 children, of which 2.7 were residing at home.
8. Mean I.Q.'s of the drop-outs were 93.1 for boys,

96.9 for girls, and 94.2 for the total group.

9. The incidence of poor school achievement, as indicated by school marks, grade failure, and achievement test data, was high among the drop-out group.
10. Almost 82 per cent of the drop-outs had not participated in extra-class activities.
11. The mean number of schools attended by the drop-outs was 3.7.
12. When compared with retained pupils in the controlled phase of the study, drop-outs had significantly poorer intelligence test scores, school marks, and attendance records; and they participated markedly less in extra-class activities. The occupational status of drop-outs' fathers was significantly lower than that of fathers of the control group. Also, significantly more of the drop-outs were not living with both parents.
13. In comparison with the control group, drop-outs' opinions regarding school were frequently negative, critical, or uncertain concerning various aspects of the school environment, pupil-teacher relationships, and subject-matter offerings.

179 pages. \$2.35. Mic 57-2734

NEGATIVE RESPONSE BIAS AND PERSONALITY ADJUSTMENT

(Publication No. 21,904)

Morton Jay Asch, Ph.D.
Syracuse University, 1957

The general aim of this study was to investigate certain aspects of the nature of negative response bias as it relates to personality adjustment. For experimental purposes, negative response bias was defined as a type of response set whereby a person tends to answer "disagree" on test items when in doubt.

Four hypotheses were subject to experimental testing:

- 1) Subjects who do not demonstrate response bias are judged, on psychological tests of personality, to be better adjusted than those who demonstrate negative response bias.
- 2) There is a significant relationship, in the positive direction, between neurotic-tendingness and negative response bias.
- 3) Neurosis is positively related to the tendency to say "no" in responding to test items.
- 4) Normal and neurotic subjects characterized by obsessive-compulsive trends demonstrate significantly more negative response bias than those whose predominant patterns of adjustment are hysteroid.

A subtle items inventory, the Speed of Decision test, was developed to measure the presence or absence of response bias in adults.

This test was administered to 500 normal male veterans. The fifty men with the lowest scores constituted the experimental "negative response bias" group. The fifty men scoring in the middle of the distribution were the control "no response bias" subjects. All of these 100 subjects were given the three personality tests used as crite-

rion instruments: the Rorschach, MMPI, and Draw-A-Person test.

The test protocols were examined by expert judges. They rated the material on three personality dimensions: adjustment, diagnosis, and dynamics. The majority or average opinion of judges on each rating for each test was obtained. In addition, a composite Rorschach-MMPI-DAP index of maximal agreement was derived for each subject. Statistical analysis of the obtained data was undertaken to study the nature of the relationships between scores on the Speed of Decision test and the judges' ratings on level of adjustment, degree of similarity to neurotic test performance, and presence or absence of obsessive-compulsive or hysteroid trends.

The results strongly indicate that there is an association between negative response bias and maladjustment. With normal subjects, the evidence also suggests that negative response bias is associated with personality trends defined as neurotic-tendingness and obsessive-compulsiveness (active ego dynamics).

A supplementary study was undertaken with fifty veterans who had a disability rating for a service-connected psychoneurotic condition. The mean score of this group on the Speed of Decision test was compared with the mean score of the 500 normals. While the two samples had different variances, their means did not differ significantly one from the other.

Differences in mean scores between neurotics diagnosed as obsessive-compulsive and those diagnosed as hysteric were negligible. Variances of these two distributions were heterogeneous.

The results of these studies suggest that there may be practical value in using a subtle items inventory, such as the Speed of Decision test, as a screening device for maladjustment. They underscore the importance of using several indices of emotional status in making individual diagnoses. Finally, they tend to support the hypothesis that deviant response patterns are general and they should encourage continued research in this area of personality study.

150 pages. \$2.00. Mic 57-2735

JUDGMENTAL PERFORMANCE OF THE BLIND AS AFFECTED BY SOCIAL AND PHYSICAL STIMULUS CONDITIONS

(Publication No. 21,878)

William Francis Combs, Ph.D.
The University of Oklahoma, 1957

Major Professor: Muzafer Sherif

The present study is based upon, and brings together, two lines of findings. (1) Previous experiments have demonstrated that situations which are lacking in stable anchorages result in attempts to resolve the attendant difficulties. The resolution of doubt and uncertainty ultimately depends on the person's discovery of social and physical anchorages in terms of which behavior can be rendered appropriate to the demands of the situation. (2) Blind authors refer consistently to difficulties of maintaining spatial orientation and of establishing and maintaining stable interpersonal relationships.

The blind are daily confronted with the task of resolving doubt and uncertainty in social and physical situations which constitute little or no difficulty for the sighted. The aims of this experimental study were: (a) to examine the influence of situational uncertainty on judgmental performance of the blind, and (b) to assess the contribution of social factors in the resolution of their judgmental problems.

Time and distance are intimately related for the blind, and estimates of time intervals allow for variations. The experimental measure employed in this study was deviation from a standard time interval (seventy seconds).

For the "individual" phase of the study time estimates were obtained from twenty-two blind subjects under conditions differing in degree of challenge or ego-involvement: (1) walking on a paved road (the "less challenging" condition); (2) walking in a rough field across which ropes were stretched at irregular heights and distances (the "more challenging" condition); and (3) sitting quietly.

For the "social" phase of the study subjects were paired so as to minimize wide individual differences and strong interpersonal relations. Time estimates were secured from nine pairs of subjects, walking together, under the "less" and "more challenging" conditions. The experimental measure was convergence, which is taken as a measure of the extent to which judgments made by a pair of subjects walking together more closely approximate some common estimate than do their judgments made alone.

The main findings of the study in terms of hypotheses tested were:

- (1) a significant difference in ratings of the "less" and "more challenging" conditions;
- (2) no significant difference between time estimates under these conditions, but a significant difference between time estimates under "less challenging" and sitting conditions;
- (3) significant convergence of judgments under both "less" and "more challenging" conditions.

Theoretical implications of the findings were discussed, and suggestions offered for further experimental research with the blind. Finally, practical applications of the findings were pointed out for training the blind to cope with daily problems of physical and social orientation.

74 pages. \$2.00. Mic 57-2736

A STUDY OF THE PATTERNS OF SOCIAL INTERACTION AT THE SENIOR HIGH SCHOOL LEVEL AND THEIR RELATIONSHIP TO CERTAIN SELECTED FACTORS

(Publication No. 20,594)

Jane Pippin George, Ed.D.
Temple University, 1957

Since about the middle of the nineteenth century the tendency has been for educators to study children in their social relationships and to become more aware of the effects upon the child of his membership in groups. This attention to the group phenomena in the classroom suggests that the student's membership in the group may be used to facilitate his learning. Therefore, an understanding of the

interpersonal relations existing in a given group at a given time and of a means by which these interactions may be measured becomes imperative for the educator whose purpose it is to take advantage of the social factors which are operating in his classroom in order to facilitate instruction.

PURPOSE OF STUDY

This study attempted to determine the norms of social interaction at the senior high school level as revealed by the sociometric friendship test and to show the relationship between these patterns of social interaction and the selected factors of grade level, standard of living, sex, and intelligence.

REVIEW OF PREVIOUS RESEARCH

Various findings of researchers such as Lewin¹ and Coch and French² have indicated the importance of the relationship between the individual and his group and learning or change in behavior by demonstrating that it is usually easier to change individuals formed into a group than to change any of them separately.

A careful inquiry failed to reveal any study which attempted to determine patterns of social interaction at the senior high school level and their relationship to selected variables. Research in different areas and at different age levels has indicated: 1. Sex has been a highly influential factor in determining sociometric choices. 2. Much importance has been attached to socioeconomic status and intelligence in determining choices. 3. Various kinds of group cleavages are likely to occur in particular age groups.

PROCEDURE USED IN STUDY

1. Data were collected from sixty classes in twenty selected schools in four states. The total of pupils was 1569. There were twenty classes each at grades ten, eleven, and twelve; five of each fell into the standard of living categories described by National Analysts, Inc.
2. Two sociometric friendship tests were administered approximately one month apart.
3. A sociograph was plotted for each class, showing each student's choices.
4. A form was designed to portray graphically all facets of the problem.
5. Interaction computation tables were constructed showing percentages of total possible acceptances, rejections, and interactions given by each class in each of the sex categories.
6. Summary interaction computation tables were constructed to compute the percentages for groups of classes combined according to grade levels, standard of living and intelligence classifications.
7. Tables of percentages were compiled for the individual classes as well as the groups.
8. Results for Test I were tested for significance between average percentages of acceptance, rejection, and interaction and classes categorized according to the four variables.

9. Consistency of response between Test I and Test II was tested by applying Spearman's rank-difference method of correlation.

FINDINGS

1. Average percentages of acceptances and interactions given to the same sex were significantly higher than those given to the opposite sex.
2. There were no significant differences between the average percentages of rejection given to the same sex or the opposite sex.
3. There were no significant differences between grade levels of the sixty-three comparisons tested.
4. There were 10 cases of significant differences between standard of living of the 126 comparisons tested.
5. There were 69 cases of significant differences between sex classifications of the 168 comparisons tested.
6. There were no significant differences between intelligence classifications of the thirty comparisons tested.

CONCLUSIONS

1. Students at the senior high school level accept and interact more with the same sex than with the opposite sex, but they reject about equally members of their own and of the opposite sex.
2. Sex was a significant factor in relationship to the sociometric friendship choices of the tenth, eleventh, and twelfth grade students included in this study, but the factor of standard of living showed little relationship to choices, and the factors of grade level and intelligence no relationship.

RECOMMENDATIONS

1. A study establishing norms of social interaction in the elementary area.
2. Investigating the reasons for sociometric choices.
3. Investigating some factors which might influence the test re-test reliability of sociometric tests.
4. Comparing the results of the friendship test with other kinds of sociometric tests in order to discover how the criterion of choice may influence selections. 140 pages. \$2.00. Mic 57-2737

1. Kurt Lewin, "Group Decision and Social Change," in T. H. Newcomb and E. L. Hartley (Eds.), Readings in Social Psychology, New York: Henry Holt and Co., 1947, pp. 330-345.

2. Lester Coch and John French, Jr., "Overcoming Resistance to Change," Human Relations, Vol. 1 (1948), pp. 512-532.

A COMPARATIVE STUDY IN PROBLEM SOLVING OF BRIGHT AND DULL CHILDREN

(Publication No. 21,973)

Horace Gene Hensley, Ph.D.
The University of Oklahoma, 1957

Major Professor: P. T. Teska

The purpose of this study was to compare the performances of bright and dull children in a problem solving situation.

A total of thirty-seven bright and dull children were tested individually on a non-language multiple choice problem box. Two groups of bright children, ages seven and twelve, were compared with two groups of dull children of corresponding age levels. The selection of subjects made possible several comparisons on the basis of chronological age, mental age, and intelligence. The older dull children and younger bright children were approximately the same mental age.

Three types of results were reported: (1) the average number of problems solved, (2) the average number of trials, (3) the average number of problems solved with verbal generalizations.

The results reveal that the older bright children solved more problems with fewer trials.

The older bright children solved an average of 77 per cent of the problems; the younger bright children solved an average of 44 per cent; the older dull children solved an average of 47 per cent; and the younger dull children solved an average of 15 per cent.

The older bright children used an average of 35.5 trials; the older dull children used an average of 67.5 trials; the younger bright children, 67.6; and the younger dull children, an average of 94 trials.

The older bright children were able to generalize on all problems that they solved. The younger bright children reported generalizations on 98 per cent of their correct solutions; the older dull children gave verbal generalizations on 66 per cent of their solutions; and the younger dull children, 19 per cent.

Comparisons on the basis of chronological age, mental age, and intelligence reveal that in terms of these data, mental age is more important than chronological age in the number of trials required and the number of correct solutions. The results indicate that successful solutions with verbal generalizations are more dependent upon brightness than upon either mental age or chronological age.

64 pages. \$2.00. Mic 57-2738

THE INFLUENCE OF WORD IDENTIFICATION ABILITY OF GROUP VERBAL INTELLIGENCE TEST SCORES

(Publication No. 21,916)

Jean-Marie Joly, Ph.D.
Syracuse University, 1957

In a study of two aspects of the problem of the influence of reading skill on intelligence test scores: the importance of word identification skill, and the relationship of the intelligence test's readability to the degree of

inaccuracy introduced by its reading requirements, the author administered, to two hundred and ten subjects of both sexes, from grades four through six, two intelligence tests, one of which yields both a reading and a non-reading IQ, two tests of auditory comprehension, a test of general reading ability, and a test of word identification skill. The intelligence tests were administered as follows: the subjects were requested first to work on every second item only; after half the time limit had elapsed, the remaining items were read to them, the intervening pauses being timed so as to permit the presentation of all skipped items in the other half of the time limit. The two raw scores derived for each subject from this mode of administration were then doubled, and two IQs were obtained in the usual fashion; the first of these, obtained on self-read items, is designated here as "standard," the second as "experimental." (This description evidently does not apply to the subtests used in determining the non-reading IQ mentioned above; they were administered in standard fashion.)

The Forbes formula was used to assess the readability of the intelligence tests.

The main findings were as follows:

1. The experimental IQs were significantly higher than the standard for the boys and for the whole sample, but not for the girls.

2. The distributions of the differences between standard and experimental IQs included approximately equal numbers of positive and negative differences.

3. The experimental IQs were not shown to be more valid than the standard IQs when the tests of auditory comprehension and of non-language intelligence were used as criteria.

4. The experimental IQs were less closely related to reading proficiency than the standard IQs; this applied both to general reading ability and to word identification skill.

5. Ability to identify words contributed to the correlation between reading and intelligence: maintaining it constant reduced the size of the correlation.

6. The algebraic differences between standard and experimental IQs were uncorrelated with the experimental IQs and the non-language IQ, and only slightly related to listening comprehension. Their correlations with reading skills, and with the standard IQs, were in the vicinity of $-.40$ and $-.45$ respectively. When the influence of word identification skill was removed from the correlation between general reading ability and the effects of the experimental administration, it was observed that the remaining relationship was not significantly different from zero.

The author concluded that (1) variations in word identification proficiency affect the scores achieved in the intermediate grades on reading-type intelligence tests; (2) with some modifications, the experimental procedure described above will provide reliable estimates of the minimum level of word identification skill required by intelligence tests for a subject to reveal his ability to deal with the concepts and relationships that constitute the matter of the tests; (3) the Forbes readability formula holds promise as a means of determining that minimum level; (4) the substantial relationship, even in the intermediate grades, between over-all reading proficiency and word identification skill, suggests the need for a continued appraisal of the latter trait, and for caution in interpreting the outcomes of attempts to measure higher reading skills; (5) the three reading-free measures of verbal intelligence

disagree to such an extent that it would be unwise to rely upon any one, as a means of detecting reading retardation, until further validation studies are available.

171 pages. \$2.25. Mic 57-2739

A STUDY OF THE INFLUENCE OF AN INTEREST INVENTORY ON CHOICE OF MAJOR AND SUBSEQUENT ACADEMIC BEHAVIOR

(Publication No. 21,732)

Archie Wilson Lay, Ed.D.
University of Houston, 1957

The purpose of this investigation was to study the influence of an interest inventory on a student's choice of major and his subsequent academic behavior. The hypothesis was that students who were counseled with the aid of the Kuder Preference Record, in addition to measures of their scholastic aptitude and achievement in various areas, would differ in satisfaction with selected major, persistence in school, and quality point average from those who selected their major without knowledge of their measured interests.

Two groups of 120 subjects each were selected from among those who enrolled as entering freshmen at a large urban university, matched with reference to age, sex, scholastic aptitude and course load. Except for one difference, each member of the two groups had complete counseling and testing prior to the final selection of an academic major. An interest inventory was used in the counseling of one group and was not used in the counseling of the other group. At the end of their first academic year these two groups were compared for: (1) changes in proposed major as a result of counseling, (2) satisfaction with selected major, (3) persistence in college, (4) scholastic action by the University, and (5) number of quality points earned.

The use of an interest inventory during the counseling process had no observable effect on the number of students who changed their proposed majors as a result of counseling. There was a tendency for those who were counseled with the assistance of an interest inventory to make changes of greater importance, such as from one profession to another, although the obtained results were not statistically reliable.

Those students who were counseled with the assistance of an interest inventory indicated a much higher degree of satisfaction with their selected major than the students who selected their major without knowledge of their measured interests. The difference in satisfaction between the two groups was statistically reliable at the five per cent level of confidence.

There was also a significant difference between the two groups in the number who withdrew from school prior to completion of the first academic year. The withdrawal rate was almost twice as high among those who selected their major without discussing their measured interests with a counselor. The obtained results could be expected to happen less than two times out of a hundred by chance variation in the groups.

Those students who were counseled with the assistance of an interest inventory also received fewer scholastic

actions. However, the difference between the two groups was not statistically reliable.

The difference in the mean number of semester hours attempted by the two groups was not statistically reliable but could be expected to happen by chance less than seven times out of a hundred. The results favored those who had taken the interest inventory prior to counseling.

There was a significant difference in the mean number of quality points earned by the two groups, with the results again being in favor of those who were counseled with an interest inventory.

Those members of either group who came to college without some idea of the field in which they intended to specialize, or who changed their minds during counseling, were less stable than those with well formulated plans. Evidence of instability of plans was revealed by increased withdrawal rate, greater incidence of scholastic actions, lower mean number of semester hours attempted, and fewer quality points earned. 108 pages. \$2.00. Mic 57-2740

THE TEMPORAL ORIENTATION OF THE RETARDED READER

(Publication No. 21,975)

Agnes Ann Manney, Ph.D.
The University of Oklahoma, 1957

Major Professor: P. T. Teska

The personality of the retarded reader has been investigated extensively; retarded readers have been found to deviate from children making normal reading progress. Temporal orientation, a part of the ego process by which the individual organizes his experiences, is an aspect of personality which research indicated should be investigated in relation to inadequate performance in reading. The purposes of this study were to determine whether the temporal orientation of retarded readers differs from that of good readers and whether temporal orientation is related more closely to reading achievement, social class membership, or age.

The subjects were 72 boys enrolled in the fourth, fifth, and sixth grades in the public schools. The subjects were classified as good or poor readers and lower or middle in socio-economic status. The same number of subjects was placed in each classification.

Each subject performed three tasks designed to reveal his temporal direction, span, and fluency. In an individual interview, each subject told stories in response to "tell me a story" and to four Thematic Apperception Test cards; estimated the span of action and classified each story as happening in the present, past, or future; and responded to questions concerning the present, past, and future.

The results showed that good and poor readers did not differ in temporal direction, span, or fluency. Middle and lower social class groups differed significantly in temporal span.

The results of this study verified findings of previous studies that temporal orientation varies with socio-economic class membership. For the finding that good and poor readers did not differ in temporal orientation, the following explanations were offered: maladjustment as-

sociated with reading difficulty may not be severe enough to affect temporal orientation; further, the subjects of the age range included in this study may not be old enough for their temporal orientations to be influenced; while poor reading may be profoundly disturbing to children as young as those of this sample, temporal orientation might not be sufficiently well organized to be used as a means of escape from present circumstances or to appear as a consistent pattern for poor readers. 74 pages. \$2.00. Mic 57-2741

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN VISUAL FIGURE-BACKGROUND DISTURBANCE AND PERFORMANCE ON RAVEN'S PROGRESSIVE MATRICES TEST IN CEREBRAL PALSY CHILDREN

(Publication No. 21,925)

Thomas John Qualtere, Ph.D.
Syracuse University, 1957

Problem

The purpose of this study was to investigate the relationship between visual figure-background disturbance and performance on Raven's Progressive Matrices tests in cerebral palsy children.

Procedure

Sixty-four cerebral palsy children, grouped according to age, type of handicap, severity of handicap and degree of physical disability were employed in this study. The chronological ages ranged from 6 to 15 years. They were divided into two groups, i.e., 32 spastic and 32 athetoid children with 16 mild and 16 moderate cases in each group. The degree of visual figure-background disturbance was determined by utilizing Strauss and Werner's tachistoscopic test as adopted by Dolphin. Each child was given the Stanford-Binet (L) and Ammons test of intelligence, i.e., in order to select only those children of "normal" intelligence; the tachistoscopic test, i.e., in order to determine the amount of visual figure-background disturbance; the Raven color test and the Raven black and white test.

Results

Significant differences were found to exist between the performance made on Raven's tests for all the cerebral palsy children with a visual figure-background disturbance, while those cerebral palsy children without a visual figure-background disturbance appeared to do significantly better on Raven's black and white test. The athetoid group performed better than the spastic group on both Raven's tests, while the children with a mild degree of handicap obtained better results than those children with a moderate degree of handicap.

In general, the results of this study are similar to those of related studies and give some merit to Raven's Progressive Matrices test as a diagnostic tool in evaluating cerebral palsy children. 130 pages \$2.00. Mic 57-2742

THE RELATIONSHIP OF CERTAIN MEASURABLE FACTORS IN THE PERSONAL AND EDUCATIONAL BACKGROUNDS OF TWO GROUPS OF BALTIMORE NEGROES, IDENTIFIED AS SUPERIOR AND AVERAGE IN INTELLIGENCE AS FOURTH GRADE CHILDREN, TO THEIR EDUCATIONAL, SOCIAL AND ECONOMIC ACHIEVEMENT IN ADULTHOOD

(Publication No. 21,716)

Edelbert George Rodgers, Ph.D.
New York University, 1956

Chairman: Charles E. Skinner

The purpose of this study was to investigate differences in achievement between a group of gifted Negro adults and a comparable group of Negro adults of average intelligence. An attempt was made to identify those factors in the childhood background of the subjects which showed a statistically significant correlation with their success in adulthood, and to compare the findings with those of other studies of gifted white and gifted Negro children.

The population for the study was drawn from the then segregated Negro section of the Public School System in Baltimore, Maryland. It consisted of two groups of fourth grade Negro pupils which were selected on a strict random basis. Group A contained only gifted students who had achieved test I.Q.'s of 130 or higher on the Illinois General Intelligence Scale in 1933. Group B served as a control group drawn from the same population and included only subjects of average intelligence who had received test scores between 95 and 109 on the Illinois Scale. The use of a control group was strongly indicated in order to enable the investigator to obtain a valid measure of the achievement of average students for purposes of comparison with the attainment of gifted students. On the basis of random selection alone the gifted group came to contain 4 males and 22 females, while the average group was composed of 27 females and 21 males. Follow-up studies were made after 21 years, in 1954, so as to evaluate the achievement of the subjects in adulthood.

The study yielded a statistically significant correlation between intelligence and adult achievement. A significantly larger number of gifted than of average subjects succeeded in moving up to middle class status. Statistically significant differences, all in favor of the gifted subjects were found in educational achievement, and source of income, and a fairly significant difference in occupational rank. Home ownership, marriage stability, number of children born, negative attitudes towards having children, military status in World War II, and voting records were found not to differentiate the two groups.

The childhood background factors in which both groups showed a fairly significant difference- though it was below the adopted level of confidence of this study - were: achievement test scores in elementary school, ranks assigned to the pupils by the teachers in elementary school, and educational attainment of parents. Happiness ratings of parents marriage, amount of punishment received in childhood, preference for father or mother, and citations won by fathers or misfortunes suffered by fathers proved to be not significantly related to adult achievement.

A comparison with other studies of gifted children shows that the high percentage of females among the gifted group (5 females to 1 male) contrasted with that of most

investigators of gifted white children who found a slight preponderance of males among the gifted and with those of other investigators of gifted Negroes who found a slightly larger number of girls. Another finding was in agreement with the results of other studies of gifted Negroes: both gifted and average Negroes came from predominately lower class homes.

Five of the basic hypotheses were substantiated:

- (1) The parents of the gifted children showed higher educational attainments than the parents of average children;
- (2) intelligence was found to correlate significantly with adult achievement;
- (3) A significantly higher proportion of gifted than of average subjects achieved middle-class status;
- (4) gifted children showed more motivation for scholastic success, obtained better grades on all levels of school education, and were ranked higher in their classes by their teachers than their less talented peers;
- (5) gifted students attained higher educational levels than average students.

128 pages. \$2.00. Mic 57-2743

THE EVALUATION OF A LESS STRUCTURED FORM OF INTEREST TEST ITEM

(Publication No. 21,829)

Robin Nelson Smith, Ph.D.
Columbia University, 1957

Chairman: Robert L. Thorndike

This study is an attempt to compare the results obtained from two vocational interest inventories. The Kuder Preference Record was chosen as representative of activity inventories using items which are of a rather specific nature, e.g., "Build model airplanes." The second inventory was constructed of items of a more general nature descriptive of coherent groups of activities, e.g., "Build something." The basic thesis of the study was that these general items would permit the subject to be more consistent and definite in his responses.

The experimental method was designed to detect any tendency on the part of the general type of item to permit more definite responses. The two inventories were administered to twelve vocational groups under similar conditions. These groups were students in various vocational training courses, ranging in academic level from grade nine to university graduation. The scores which the subjects obtained on both inventories constituted the basis of the comparison.

Five aspects of the results were studied. The predicted interests of the vocational groups were compared with the results of the experimental test and found to be similar. The area preferences of each group were ranked. The correspondence of the two tests in this regard was indicated by a median Rho of .83. For individual subjects the two tests were found to have a correspondence as indicated by median Rho's of .85 and .80. Next, the ability of each test to separate a group high in some area of interest from a group low in the same area was found. The "t" ratio was used as the measure of separation, and on this basis the experimental test produced the wider separation in thirty-seven of the fifty comparisons afforded by the data. Finally, the ability of each test to

demonstrate that the predicted areas for each group had the lowest coefficient of variation was examined. Here, both tests were unsatisfactory with one group, were equally satisfactory with five, and the experimental test was superior with the remaining six.

The conclusion reached was that, within the limitations of the data and the experimental conditions, the general type of item, as represented by the experimental test, was at least the equal of the more specific type of item, as represented by the Kuder Preference Record, in regard to the properties compared. 118 pages. \$2.00. Mic 57-2744

THE RELIGIOUS CONCEPTS AND ATTITUDES OF ONE HUNDRED COLLEGE STUDENTS

(Publication No. 21,676)

Lena Pearl Duell Vincent, Ph.D.
University of Michigan, 1956

This study sought information concerning the spiritual and religious needs of university students, assuming that there are definite religious needs in a college population, sometimes obscured by various defenses, and that many of these needs remain unsatisfied. Attitudes, ideologies, and conduct relative to God and the Church were assessed from data submitted by 100 students, utilizing the Thurstone-Chave Experimental Study Schedules, Personal Data Sheets (students and parents), and the Michigan Sentence Completion Test. Direct questions were answered relating to spiritual values, the conversion experience, the home, and the church. Fifty-six were Protestant, 20 Jewish, 14 Catholic and 10 "Other;" average age, 18.25. The population was "mildly favorable to God," the women slightly more favorable than the men. Theistic or non-theistic concepts and attitudes were obtained from the God as Reality and God in Conduct Scales and from the stem "Sin" on M.S.C.T.

Among trends established were: Those with firm faith in God were higher in sensitivity to and avoidance of sin, than those without belief; those highly identified with the church tended to regard sin seriously. Students' attitudes toward sin tended to reflect home conditionings; and home atmosphere correlated with the number of children's conversions. A functional belief in God and/or sin is not correlated with formal church affiliation; but high church attitude correlated significantly (.01) with religious experiencing (conversion experience).

Intercomparisons made between those reporting and those not reporting conversion showed non-significant differences in personal responsibility--irresponsibility, the immortality concept, the relativistic theory of sin, and certain negative social attitudes. The proportional number of conversions among different faiths achieved significance (.01) depending upon the group-emphasis on this experience, but not among the five differently oriented religious groups. The conservative side of the continuum showed greater carefulness to "avoid sin." Homes contributing much religious education showed greater frequency of conversions (.02) than the homes providing some or none; and the homes "commented on" were significantly different (.01) from those "not commented on."

Sixty-six of 100 students agreed that "cultural enrich-

ments" and the "graces of the spirit" were both spiritual values. Nominal religious or spiritual values were significantly influenced by varying amounts of religious education in the home (.05), but the "deeper religious needs" seemed uninfluenced. Both home and church continued Attitudes toward the Church, while conceptualized Attitudes toward the Church, while conceptualized significantly influenced by the church (.02), but not by the home. Home conditionings interacted significantly on the "sin question," (.004 and .025), but the church showed no significant relationships.

Parental and student attitudes toward God and toward the Church differed significantly (.01); similar differences emerged whether children tended to identify with one parent or both. Young people, in general, were significantly more free (.001) to comment (approve--condemn) on the church than on the home.

Those highly oriented toward God through experience or conditionings, tended to feel heavier stresses of the "Sturm und Drang" Period, (super-ego strivings) than the neutrals or negatives; and the highly and mildly positives were significantly different (.01) from the neutrals and negatives in matters of conscience, right and wrong, and moral, ethical or religious conviction. This level of significance also differentiated the positives and negatives on Attitudes toward God; but intellectual needs, drives, interests, ambitions and goals, were not thus differentiated.

Three unique factors emerged from this study, the variables of need for prayer, divine guidance, and intellectual needs, which were apparently independent of the other variables measured. Factor analysis and orthogonal rotation revealed two sorts of factors--ecclesiasticism or theism, and humanistic or ethical secularism, which seemed to harmonize with a common-sense view of the dynamics of religious and/or moral sanctions.

456 pages. \$5.80. Mic 57-2745

EDUCATION, TEACHER TRAINING

AN ANALYSIS OF THE PREVIOUS TRAINING OF HIGH SCHOOL ART TEACHERS WITH RESPECT TO THE PERCEPT AND PREFERENCE SELECTIONS OF THEIR STUDENTS

(Publication No. 19,267)

Charles Canon, Ed.D.
Indiana University, 1956

Chairman: William H. Fox

Problem

The problem of this investigation was to determine the extent to which the previous post-secondary training of a selected group of high school art teachers was related to the performance of their students on an experimental percept and preference art test. The data revealed other variables whose relation to the major variable could be tested. They were (1) the size of the schools in which the

students were enrolled, and (2) the class standing of the students. The Mills Percept and Preference Art Test was used as the instrument for measuring this relationship.

Procedures

The steps involved in the development of this investigation were: (1) to calculate the product-moment of correlation between successive administrations of the instrument to obtain an indication of its reliability; (2) to select the high schools, high school art teachers, and high school art classes; (3) to administer the test in the selected localities to the groups of students; and (4) to analyze the data using the statistical technique of analyses of variance to determine the significance of differences between the means of the variables.

The art test was designed to determine the role art training in the public schools plays in conditioning, influencing, and distinguishing between art forms and objects. In order to check the reliability of the test, it was administered twice to a representative group of 52 high school students. The obtained values of the product-moment coefficient of correlation between scores on successive applications were: Test I, $r = .77$ and Test II, $r = .55$.

This study was restricted to secondary public high schools in the State of Illinois. The schools were selected by: (1) the location, (2) recognition by the state, (3) the existence of an art program, and (4) the previous training of the art teachers. Schools with enrollments of 800 or more were selected.

The high school art teachers were divided into three groups: Group I, those with the minimum or close to the minimum of college art credits for licensing and/or graduation by the state for teachers of high school art; Group II, those with considerably more than the minimum; and Group III, those who had exhibited their own art work. Nineteen teachers were selected.

The art classes were selected on the basis: (1) that the art course should be elective, (2) that the courses should be similar in nature, and (3) that each should be the first high school art course taken by the students. There were 353 students in the teacher groups.

Findings

The results of the analyses of variance were:

1. The analysis of variance calculated on the percept and preference sections of the art test between students falling within the teacher groups showed no significance at the five per cent level of confidence. The null hypothesis must therefore be retained.

2. The analysis of variance between the means on both sections of the test by size of schools indicated no significant differences at the five per cent level of confidence. The null hypothesis is retained.

3. The analysis of variance between the means by the class standings of the students were not significant at the five per cent level of confidence. The null hypothesis is retained.

4. The major variable of teacher preparation as well as the size of the schools and the class standings failed to be significant as related to pupil performance. Secondary variables were analyzed. Analysis of variance calculated on the percept section of the test between the scores of the students and their various classes showed no significance

at the five per cent level of confidence therefore retaining the null hypothesis.

5. The analysis of variance on the preference section of the test between the scores of the students and their various classes showed a significance at the one per cent level of confidence. Thus the null hypothesis may be rejected at the one per cent level of confidence.

6. In order to discover wherein lie the differences, t-tests were computed for all possible pairs of groups. Consistent differences were found between the highest means and the lowest means. Inspection of the variables indicates no systematic pattern. Application of the extended tables of the Mann-Whitney Statistic bears this out. On the basis of the U-value computations, the null hypothesis is retained at the five per cent level of confidence.

Main Conclusion

The major variable of teacher training, as measured by the number of credit hours of post-secondary training and exhibiting of the art teachers, does not significantly affect pupil performance on either section of the percept and preference art test. The size of the schools, the class standings, and the various classes of the students do not appreciably affect pupil performance on either section of the test. Thus, the factors studied are not associated with differences in the level of percept and preference abilities of the students and conditions under which the present study was made.

158 pages. \$2.10. Mic 57-2746

PROFESSIONAL LABORATORY EXPERIENCES IN PHYSICAL EDUCATION

(Publication No. 21,990)

Jared Quitman Long, Ph.D.
Louisiana State University, 1957

Supervisor: W. A. Lawrence

The purpose of this study was (1) to determine the professional laboratory experiences provided in programs of selected colleges for prospective teachers of physical education (2) to determine the nature and quality of these experiences, and (3) to analyze these practices in terms of basic principles set forth by the Sub-Committee on Surveys and Standards of the American Association of Colleges for Teacher Education.

The first eight principles of the American Association report, concerned with education in general, were related with similar statements of principle from the report of the National Conference on Undergraduate Professional Preparation for Physical Education, Health Education and Recreation. These principles were analyzed and expressed in terms of implied practices. From these statements of practices, three check-lists were developed. One check-list was sent to forty-four college administrators to secure data concerning administrative practices which influence the nature and quality of laboratory experiences; thirty-six responses were received. Another check-list was sent to two hundred five teachers of undergraduate courses in physical education to obtain data on experiences prior to student-teaching; one hundred

sixteen responses were made. The third check-list was sent to fifty-one supervisors to obtain data on practices during student-teaching; thirty responses were received from this check-list. These replies were tabulated and analyzed as they related to the statements of principles. Each practice met the criterion satisfactorily if it was reported as a uniform or a general practice by fifty per cent of the respondents.

Practices reported and evaluated by administrative personnel were related to selection of laboratory schools, curriculum, facilities, status of personnel, prerequisites, admission, supervision, guidance and evaluation. Practices reported and evaluated by teachers were concerned with personal data, courses employing laboratory experiences, nature and sources of experiences, assignments, observation-participation experiences, establishing concepts, and evaluation. Practices reported and evaluated by supervisors were concerned with personal data, practices of responsibilities, assignments, pupils in classes, activities of classes, nature of student-teaching, conferences, need for further study and evaluation.

The following conclusions were reached: Principle I was being implemented; Principles II, III, and VII were being implemented with minor limitations; Principles IV and VI were being implemented but with certain major limitations; and Principles V and VIII were limited in the degree to which they were being implemented.

Recommendations based on the conclusions were:

(1) the school administration would strive to provide better control over the teaching-learning situation, provide more functional contacts for experiences, perfect the guidance system, and require broader subject matter participation in professional laboratory experiences; (2) college teachers should organize and provide laboratory experiences in their courses, use more effectively the guidance records, and use practical community and home situations for laboratory experiences; and (3) supervisors should provide wider participation in all phases of the teacher's activity, provide wider variety of experiences with several levels of teaching, and keep and use guidance records more efficiently.

305 pages. \$3.95. Mic 57-2747

A STUDY OF THREE SELECTED FACTORS IN THE PUBLIC RELATIONS PROGRAMS OF COLLEGES AND UNIVERSITIES IN THE UNITED STATES

(Publication No. 21,384)

Albert Westley Rowland, Ed.D.
Michigan State University, 1955

This study is concerned with an analysis of three selected factors in the public relations programs of colleges and universities in the United States: philosophy and objectives of educational public relations, evaluation of the public relations programs, and the most important public relations problems facing colleges and universities.

Within the framework of this study, information was also obtained concerning the relationship of the American College Public Relations Association and its members to the basic objective of the Association, and methods by which the Association can better serve its member colleges and universities are suggested.

The data for this study were obtained from responses to a questionnaire which was sent to the chief public relations officers of the 600 colleges and universities which are members of the ACPRA. A total of 272 replies were received, representing institutions of higher learning in 48 states and the District of Columbia.

The following is a brief summary of the major findings and conclusions of this study:

(1) Over half of the reporting schools cited interpretation of their institution to its publics as the basis of their educational public relations philosophy. Building and holding good will for the institution was rated highest as an objective.

(2) Although some members of the ACPRA are attempting to contribute to the general purpose and objectives of the organization, this study showed that the Association is notably weak in making a significant contribution to the "advancement of higher education in general."

(3) Major ways in which the ACPRA can improve its services to members are: exchange materials and ideas; develop evaluation teams; and make a strong, forceful effort to communicate with top administration.

(4) One of the weakest areas in educational public relations is evaluation. Public support and good will are considered the most important long-range criteria for evaluation of the program, but specific methods have not been developed by which reasonable appraisals can be made. A large number of respondents rate their present methods of evaluation as only "fair." Polls, surveys, and interviews are suggested as the best methods for the improvement of educational public relations evaluation.

(5) The most important problems facing colleges and universities are related to meeting the large enrollments expected in the future. This study reveals specific steps being taken now to meet these problems, as well as programs which must be undertaken in the future.

(6) Public relations has not yet reached the stage where it can be called a profession; public relations people are struggling to establish status; and publicity continues to be predominant in the concept of public relations.

(7) Finally, this study indicates that the meaning, place, and nature of public relations are not firmly established in institutional policy; mechanics of the trade demand a majority of the time of public relations practitioners; and that the student seems to be forgotten in most public relations programs.

198 pages. \$2.60. Mic 57-2748

AN EVALUATION OF TWO METHODS OF TEACHING READING

(Publication No. 19,282)

Paul Emerson Sparks, Ed.D.
Indiana University, 1956

Chairman: Robert W. Richey

Summary

Purpose of the Study. The purpose of this investigation was to compare a method of teaching reading known as the Phonetic Keys to Reading with a method of teaching reading known as the Basic Reading Program.

Procedures. Two groups of first, second, third, and fourth grade pupils from Schools A and B had been taught to read by the two different methods. School A, using the Phonetic Keys to Reading method, had 418 pupils. School B, using the Basic Reading Program method, had 406 pupils. All pupils were given a mental ability test and a reading comprehension and vocabulary test. In addition, the fourth grade pupils were given a reading speed and accuracy test and a spelling test.

Statistical techniques. Data were analyzed by the analysis of covariance techniques to determine whether there were significant differences in the test performance of the two groups at each grade level, using, successively, all subjects, girls alone, boys alone, fast learners alone, and slow learners alone. The criterion of classification was between School A and School B. The controlled variable was the intelligence quotient.

Conclusions

1. The first grade group of School A, and all sub-groups, was significantly superior in comprehension and vocabulary. There was some possibility that the test favored this group.
2. The second grade group of School A, and all sub-groups, was significantly superior in comprehension. There was no significant difference between the groups in vocabulary.
3. There was no significant difference between the two groups at the end of the third grade.
4. There was no significant difference between the two groups at the end of the fourth grade in comprehension, vocabulary, speed, and spelling. There was slight superiority in reading accuracy on the part of the pupils of School B. With this exception, it appeared that the two methods produced approximately the same end results.
5. It appeared that the Basic Reading Program method gave the learners sufficient phonetic training.

Recommendations

1. Similar tests should be administered to both groups at the end of another year, and at the end of two more years, to determine whether there are still no significant differences.
2. Similar experiments should be performed for reading methods which tend to over-stress any phase of the mechanics of reading.
3. Evidence such as this should be used to refute the charges that conventional reading series neglect phonetic training, or that such training is the panacea for reading problems.
4. Experiments should be performed to compare different reading tests to determine whether the tests appear to favor a particular phase of training to read.
5. Since no advantage was found in using the Phonetic Keys to Reading as a basal reading program, the common practice of using the Phonetic Keys to Reading materials for a separate phonics period or to supplement another basal reading series should be seriously questioned.

161 pages. \$2.15. Mic 57-2749

EDUCATION, THEORY AND PRACTICE

THE CONSTRUCTION AND TRIAL STUDY OF A LANGUAGE DEVELOPMENT TEST FOR CHILDREN UP TO THREE YEARS OF AGE

(Publication No. 21,730)

Margaret Cooper Crabtree, Ed.D.
University of Houston, 1957

Although many investigators have been able to satisfactorily apply statistical formulae to show that certain aspects of language, such as grammatical usage and articulation, are independent, describable, testable, and significant abilities, a search of the literature failed to reveal a test that could be used to assess the language of an infant or child up to the age of three.

The purpose of this study was to construct a test for measuring the language age of children up to three years. This test was administered to a stratified sample of children in order to evaluate it from the standpoint of (1) ease of administration, (2) validity of items, (3) reliability of measurement, and (4) adequacy of instructions.

Items were selected from the literature that were considered representative of the various aspects of language development. The broader areas considered were, reception, conceptualization and expression. The more specific areas were, articulation, tone, or melody, rhythm, gesture, vocabulary, grammatical, and dynamic usage.

These items were grouped into six months' periods, and the ages for testing were, six, twelve, eighteen, thirty and thirty-six months. A form sheet for checking the items was developed and instructions for administering the test were written.

A stratified sample of 113 white children who were within a month of the critical birthday were located in the Greater Metropolitan Area of Houston. These children were equated as to sex and age. The study avoided bilingualism in the home, multiple births, institutionalized cases and observable mental or physical defects. One examiner tested all of the sample and was followed by a second examiner who retested a portion of the sample within a week of the original test.

The items were scored on a percentage basis and rearranged according to difficulty. Items were discarded that were too easy or too difficult, except in such cases where the retention of the item was necessary in order to cover the range to be tested. The items were transferred from one group to another as the range of percentage scores indicated the need. Chi-squares were used to determine the reliability of differences relating to sex or to paternal occupational grouping. There was no significant difference, although the upper socio-economic groups and the girls had slightly higher scores. This tendency increased with age. After the test items were rearranged, the items were weighted and a chart for scoring the test was devised.

The reliability score of the test as determined by the Pearson r formula was .84. 110 pages. \$2.00. Mic 57-2750

A SURVEY OF SELECTED DISTRIBUTIVE EDUCATION PROGRAMS IN NEW YORK STATE: A STUDY OF SPECIFIC COOPERATIVE PART-TIME RETAILING PROGRAMS BASED ON PERSONAL VISITATION AND OBSERVATION AT SCHOOLS AND TRAINING STATIONS

(Publication No. 21,724)

Ettore John Gradoni, Ed.D.
New York University, 1957

Chairman: Herbert A. Tonne

The purpose of this investigation was to determine the status of certain aspects of cooperative work training in selected federally reimbursed distributive education programs in New York State. Completion of the study involved the formulation of standards and an analysis of program and training station practices; the solicitation of employer evaluations of trainee-graduate job performance; and the preparation of recommendations for program improvement.

Pertinent literature in the field was studied to develop evaluative criteria. A panel of experts refined the statement of standards used to develop three interview checklists. The checklists were tested in a pilot run, revised, and then used during visitations to 14 school programs and 157 training stations. Job performance ratings for 259 trainee-graduates were analyzed.

Fifteen tables summarize by numerical score and rank the extent to which specific school programs, training stations, and trainee-graduate work performance records comply with established criteria in such areas as aims and objectives; organization and administrative practices; curriculum content; instructional materials and methods; physical facilities, equipment and supplies; student and teacher personnel practices; coordination activities; evaluation practices; training station activities; job assignments; job performance traits, knowledges and skills, and sales performance factors.

This study revealed that trainee-graduates and employers benefit materially as a result of their participation in cooperative part-time retail training programs. However, certain conditions have developed which will adversely affect future program progress if not remedied.

Some of the main conclusions and recommendations suggested by the findings are:

1. A restatement of certain aims and objectives in terms of more immediate and measurable goals is needed.
2. Increased merchant support, adjusted work schedules and better use of participating training stations can minimize the problems created by the seasonal nature of retailing and the need for continuity in work experience.
3. The appointment and use of advisory committees should result in better coordination between program activities and community employment needs.
4. All trainees should obtain required work experience.
5. Additional specialization in curriculum content appears justified.
6. Teacher-coordinators should make greater use of specialized instructional techniques particularly suited to cooperative work training.
7. Adequate facilities, equipment and supplies must be provided for effective distributive education instruction.
8. Teacher-coordinators need current work experience.
9. The confusion that exists regarding student quali-

fications for cooperative work training must be resolved through the joint efforts of school officials, coordinators and employers.

10. Time allotted for coordination duties should be devoted to such work and school officials should require written coordination reports.

11. The State Education Department should assist local communities to evaluate their cooperative retail training programs.

12. Many training station problems can be avoided by the use of written training agreements.

13. School personnel should assist merchants to develop more effective methods for evaluating trainee-graduate work performance. 221 pages. \$2.90. Mic 57-2751

CHANGING OBJECTIVES IN BUSINESS EDUCATION ON THE COLLEGIATE LEVEL IN THE UNITED STATES FROM 1899 TO 1954

(Publication No. 21,711)

Dorothy Elizabeth Lee, Ph.D.
New York University, 1957

The collegiate schools of business in the United States began with different objectives. The Wharton School, for example, placed major emphasis on liberal arts, while New York University took a vocational approach. No study of the objectives of these schools had been made that included developments to the present.

The purpose of this investigation was to determine what changes in objectives occurred from 1899 to 1954 and the extent, if any, to which these changes were caused by economic conditions. The practical applications lay in the implications for future curriculum planning.

The institutions selected for study were the undergraduate members of The American Association of Collegiate Schools of Business.

Those changes in objectives which could be observed from a study of the catalogs of the selected institutions were determined. What educators and businessmen said the objectives should be, as contrasted with the purposes revealed by college catalogs, was noted. Economic changes that occurred in the United States from 1899 to 1954 were considered in order to determine whether or not a causative relationship appeared to exist between these developments and changes in objectives. The data obtained were compared at intervals of marked economic change.

The conclusion was reached that the collegiate schools of business, at the end of the period studied, considered their chief function to be the offering of professional training for leaders of American business. It was agreed that this could best be done by giving programs that represented a balance between liberal arts and technical subjects.

Catalog statements of purpose revealed no change during the period studied. Consideration of curricula offered, however, showed that changes in objectives had occurred in that a wide variety of fields of specialization were available, as compared with the beginning period of development when only general business or accounting specialization was possible. Also, all the schools in the

group were presenting programs that were relatively balanced as to technical and liberal arts courses.

The evidence did not indicate that these changes necessarily resulted from response to economic developments. The collegiate schools of business were started because they were demanded by the economic situation. However, as they developed, statements of purpose and curricula offered gave little indication of a response to directly felt business needs. New areas of specialization, for example, did not appear until after the time at which they were needed.

These schools also failed to respond to economic change by not recognizing that management training had become a discipline of itself and called for a special type of preparation. The programs of study offered were traditional in nature: tool subjects of business, general background courses, and concentration on a field of specialization. It was not recognized that top-level management activity was more than specialized participation in a business operation.

If adequate curricula are to be planned for the preparation of business leaders, the nature of management activity must be defined. A theoretical framework for the functions of management must be developed, since "management" is now more than a routine technique. Also, the specific abilities required for successful management performance must be determined.

As management performance appears to require distinct abilities, thought must be given to more scientific selection of students. Effort must be made to recruit and retain faculty oriented to teaching students how to administer business rather than to teaching how business operates.

The curricula developed must be flexible and readily adaptable to needs arising from a dynamic economy.

Purposes and curricula must be reevaluated continuously and altered to meet business needs if the collegiate schools of business are to be of the greatest service in preparing business leaders. 268 pages. \$3.45. Mic 57-2752

PROBLEMS INVOLVED IN PRODUCTION AND USE OF APPROPRIATE EDUCATIONAL TELECASTS BY THE MICHIGAN DEPARTMENT OF PUBLIC INSTRUCTION

(Publication No. 21,390)

Burton Kellogg Thorn, Ed.D.
Michigan State University, 1956

Purpose.--The study had two purposes: (1) to report the problems which occurred in planning, producing, using, and evaluating a series of educational television programs; and (2) to report the solutions which were found for these problems. The series was developed under the auspices of the Michigan Department of Public Instruction.

Method.--A detailed log was maintained throughout the period when the television series was planned, produced, used, and evaluated. The log consisted of a report of the activities which occurred in the following aspect of developing the series:

1. Determining the type of series to produce
2. Securing station facilities
3. Securing an audience

4. Surveying local school administrators and teachers
5. Working with pilot schools
6. Using consultant help
7. Planning the series
8. Securing a budget
9. Obtaining film
10. Using visual aids and props
11. Maintaining station relationships
12. Writing script
13. Rehearsing and broadcasting
14. Using the live broadcasts
15. Using the kinescopes
16. Evaluating the programs

Prior to beginning these developmental phases, selected literature pertaining to each phase was reviewed. A week was spent in Philadelphia studying educational television as used in the public schools. The review of literature and of practice in Philadelphia provided necessary background for the television series.

Findings and interpretations.--A total of twenty-six problems occurred. These were listed, and the solutions which were found were reported. The problems and solutions were stated in terms intended to make them helpful to an individual lacking television production experience but faced with producing a series of educational telecasts. These conclusions were reached:

1. **Planning the Series.**--Detailed, timely, cooperative planning is essential to the success of a television series. Detailed planning can be responsible for success or failure in (1) securing approval of a series, and (2) carrying a series through to completion. Planning can be detailed to the extent of impeding the effectiveness of a series. Timely planning will make it possible to coordinate the many detailed operations within the available time limits. Co-operative planning is necessary to secure good relationships between the producer, the members of his organization, people from local communities who are involved in production, the talent, and the station personnel. Cooperation will assure sharing of ideas, decisions, and responsibilities; this sharing is vital to a valuable product.

2. **Producing the Series.**--The producer, fortified by the advice and counsel of those with whom he plans, must assume the role of the educational authority. He must have sufficient training and experience in the television medium to deserve the respect and confidence of those with whom he works. He must be willing to regard the station personnel as authorities in technical television; he must be in a position to insist upon being regarded as the educational authority.

3. **Using the Series.**--He must make plans for several types of uses of the series. Failure of one or more anticipated uses is then likely to leave at least one effective use which materializes. If the existence, size, or appropriateness of an audience for the live telecasts is uncertain, and if the programs have repeat value, the series should be kinescoped for use as films.

4. **Evaluating the Series.**--The series should be evaluated in terms of its purposes by its users and by its intended consumers. Sufficient means of evaluation should be planned to secure dependable results. Early evaluations should be utilized to improve the unfinished portion of the series. The total results should be analyzed in order (1) to justify the effort and expense of producing the series, (2) to justify the production of future programs or series, and (3) to improve the next program or series.

341 pages. \$4.40. Mic 57-2753

**A STUDY OF THE TEACHING OF ENGLISH AS A
FOREIGN LANGUAGE WITH SPECIAL REFERENCE
TO IRAQI SECONDARY SCHOOLS**

(Publication No. 21,541)

Hamdi Younis, Ed.D.
University of Maryland, 1957

Supervisor: Dr. Kenneth O. Hovet

This study was concerned with practices in the field of teaching English as a foreign language in Iraq, Germany, France, Britain, and the United States, with a special emphasis on the linguistic researches and the modern approaches employed in the institutions in England and in the United States.

The purpose of this study was to state the guiding principles related to various aspects of teaching English as a foreign language and to formulate these principles into a methodology for the training of Iraqi teachers to teach English in the secondary schools.

These principles (in Arabic the meaning of "principle" and "objective" can be expressed by a single word which, spelled phonetically, is "mabda") included those observable

in operation in eminent institutions of the various countries and those stated by prominent authorities whose work forms most of the current literature in this field.

Three areas may be mentioned as indicative of the scope of the study:

1. The present situation in the teaching of English as a foreign language in the Iraqi secondary schools.

2. A descriptive and an analytical exposition of different approaches being used in various schools and institutions in Europe and the United States. This analysis covered approaches based on such modern linguistic researches as those developed by the University of London, the University of Michigan, the State Department (the Foreign Service Institute) and the American Learned Societies; those developed in Basic English; and those more conventional ones which are exemplified in the old theory of teaching a foreign language.

3. Recommendations were presented in the form of a program involving those guiding principles related to the various aspects of teaching English, those judgmentally considered as being relevant to and consistent with the present situation in Iraq for improving the conditions under which students in the Iraqi schools are learning English.

372 pages. \$4.75. Mic 57-2754

ENGINEERING

ENGINEERING, GENERAL

COST DETERMINANTS OF PROCESS PLANT DESIGN: CENTRAL STATION BOILERS

(Publication No. 21,834)

George Elwin Watkins, Ph.D.
Columbia University, 1957

This thesis presents a method for developing economic design parameters for an industrial bulk processing operation. The problem is: How can industrial process plants be designed for minimum cost operation under future conditions. The operation investigated is the conversion of the latent energy in fossil fuel to heat energy in steam in central station boilers.

In Parts I and II boiler types and design trends are analyzed with economic factors associated with design changes being examined and evaluated. The ratio of two cost factors, boiler and fuel cost, related to the process of steam generation, is demonstrated to have marked correlation with boiler design development. Other necessary conditions for design evolution are categorized and investigated. Tabulations are presented showing that at several time points during the central station era, preferred boiler designs have consistently been based on one of the several categories of necessary conditions for design change. The ratio of boiler-fuel cost was the dominant factor in determining the course of design changes. Boiler design and the boiler-fuel cost ratio are found to be connected by a defined intervening mechanism of managerial decision making.

The demonstration of the determined relationship between boiler design evolution and the ratio of the two dominant economic factors involves the development and analysis of central station fuel costs, boiler costs and other components of boiler operating and maintenance expense. To allow an economic evaluation over time of these factors under the conditions of improving productive capacity of successive designs of steam generators, a graphical method is developed for equating fuel costs, boiler costs and boiler productivity. These cost factors - fuel and boiler investment - are shown to have motivated boiler design.

To extend the conclusion of a causal relationship between boiler design, fuel cost and boiler investment cost as developed for the U. S. similar economic data is examined for three industrialized countries of Europe. The comparable findings substantiate the results of the U. S. investigation.

In Part III a predictive framework for certain broad boiler design parameters is developed, based on the relationships between boiler design and the boiler-fuel ratio determining design. Examples are presented of the use of the framework. Under assumed future conditions productive capability of designs are defined. Cost trends of power station fuel and boiler investment are extrapolated. From the predictive framework of boiler efficiency, size and cost, the writer inferred the productivity improvement that

must be realized at a particular future time to offset cost increases. Under existing thermal power technology, the design of central station equipment to achieve this productivity gain would result in plants of unprecedented and probably unworkable capacity.

In Part IV the practices of electric utility companies in selecting the capacity of future generating units is reviewed. With this determination being largely a function of total system capacity, the future trends of the largest U. S. electric utilities are tabulated, based on expected growth. It is demonstrated that at a near future time predicted system loads will not allow the major systems to accommodate units of the capacity required to economically offset expected increases of fuel and boiler costs.

In view of these findings, the anticipated costs of nuclear reactor generation of steam are examined. This analysis proves the importance of the developed cost method for predicting the requirements of the steam generation process in future central steam-electric stations.

The methodology for determining certain general design parameters, applied in this thesis to a particular process plant operation, can probably be used for the development of economic designs in other industrial processes.

373 pages. \$4.80. Mic 57-2755

ENGINEERING, CHEMICAL

FLOW PATTERNS IN CYLINDRICAL SETTLING TANKS, PART I: APPLICATION OF MODEL ANALYSIS TECHNIQUE TO SETTLING TANK FEED WELL DESIGN

(Publication No. 21,980)

William Leon Barham, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Arthur G. Keller

Cylindrical settlers have found widespread industrial application since the turn of the century. In this time, there have been few contributions to the basic understanding of flow patterns in these vessels. Consequently, there is a dearth of knowledge as to how these patterns affect the distribution of suspended solids for their efficient separation in the settler.

One of the most important factors determining the flow pattern in a settler is the feed well. These are the distributors of the incoming suspension, and thus are of utmost importance to efficient operation of the unit.

Because of the importance of the feed well and the difficulties involved in full-scale studies, a simplified method for their evaluation has been devised. By the application of the principles of hydraulic similitude, scaled-down

models of ten feed well designs were fabricated for study. The use of these models reduces the expense of experimentation to a small fraction of that required for investigation with full size equipment.

The effect of these designs on the flow distribution in a cylindrical vessel was determined by means of small plastic spheres injected into the stream leading to the model feed well. Motion pictures were taken of these spheres and subsequently analyzed to obtain qualitative results. Quantitative results were derived by statistical treatment of the distribution of spheres.

Of the ten designs fabricated, five were considered to be unsatisfactory as a result of the motion picture analysis. The remaining five designs were examined by statistical procedures. One of the three conical diffuser designs was found to give the most uniform distribution of particles, however, a feed well of this type would not be practical for multitray settlers. The two and four point impingement type feed wells were found to produce a very satisfactory flow pattern and particle distribution. These two designs are to be tested in industrial size mud settlers.

96 pages. \$2.00. Mic 57-2756

A STUDY OF METHODS FOR OBTAINING UNIFORM STRAIGHTLINE AIR FLOW IN SPRAY DRYERS

(Publication No. 21,849)

Walter Thomas Darnell, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor W. R. Marshall, Jr.

An experimental investigation was made to study simple spray dryer air inlet geometries consisting of relatively small inlet ducts and headspaces and distribution devices (of low pressure loss) that could be used to produce uniform straightline flow (i.e., flow such that all of the velocity components are essentially axial, and the axial components are of approximately the same magnitude across the cross-sectional flow area) in spray dryer models. It was especially desirable to obtain design information applicable to cylindrical, vertical spray dryers having cocurrent flow of drying air and spray, with conventional atomization (i.e., pressure nozzle, pneumatic, or spinning disk). Preliminary investigation indicated that the use of only one, or at the most two, openings for introduction of the inlet drying air and the use of perforated distributor plates (placed just upstream of the drying chamber in a plane perpendicular to the axial centerline of the dryer model) were suitable for this purpose. However, two perforated plates in series, or a combination of a perforated plate and a perforated baffle or baffles were necessary for uniform distribution when a single, small inlet duct was used.

Therefore, the effect of the following design variables were determined over the ranges indicated by conducting tests in two cylindrical spray dryer models made of transparent "Lucite," which were 1 and 2 feet in internal diameter and had overall heights of slightly over 3 and 6 feet respectively:

- (1) inlet geometrical shape, or the general geometry of the top portion of the model spray dryer (14 different inlets were used that were based on five major geometrical shapes);
- (2) the inlet area ratio or the ratio of the cross-sectional flow area of the main dryer tower to the inlet duct, or ducts (this was varied from 9.0 to 64.0);
- (3) the total headspace, or the distance from the perforated plate to the roof of the model was varied from 0.208 to 0.75 tower diameters;
- (4) the geometrical characteristics of ten different perforated plates and one screen plate with percent free areas of 8.16 to 57.2, round hole diameters of 1/16 to 3/4 inches, and thicknesses of 1/16 to 1-1/4 inches were studied;
- (5) the geometrical characteristics of 19 different perforated baffles, 1/16 inch thick, with percent free areas of 8.16 to 51.0, perforations consisting of round holes of 1/16 to 3/8 inches in diameter, all were rectangular or circular in shape and were of various dimensions;
- (6) the locations of the perforated vertical baffles above the perforated plates and with respect to the position of the inlet ducts;
- (7) the Reynolds number in the models was varied between 4,500 and 85,000; and
- (8) model scale-up (one model was a two-to-one linear scale-up of the other).

The uniformity of the air distribution was measured quantitatively through the use of correlation variables (applied to experimental values of the local velocity components) that measured the non-uniformity of the axial velocities and the quantity of axial flow. Pressure drops and losses were determined for design purposes and also to aid in evaluation of the distribution devices.

The controlling design variables were found to be the geometry of the inlet; inlet-to-tower area ratio, headspace; the use of one or two perforated plates; perforated plate free area and ratio of hole diameter to thickness; and perforated baffle location, free area, and dimensions. The Reynolds number and scale-up were found to be of only small significance. 378 pages. \$4.85. Mic 57-2757

ION DISTRIBUTION DURING ELECTROLYSIS

(Publication No. 22,042)

Herbert Peter Dengler, Ph.D.
Columbia University, 1955

A theory is developed to predict the concentration gradient in the cathode film for an electrolyte undergoing electrolysis. The theory is derived by setting up a matrix based on the thermodynamics of the steady state and which describes the flow of the anion, cation and undissociated molecule. Solution of the matrix involves evaluating the force coefficients from data available on the behavior of electrolytes. Although the basic theory is felt to be completely general, it is necessary to make some simplifying

assumptions in order to solve the equations for the individual flows and the cathode film concentration gradient. However, the framework of the theory is set up so that as more is learned about electrolytes, the information can be incorporated into the equations, thereby improving the accuracy of the theoretical predictions.

The flows of the anion, cation, and undissociated molecule are derived and, from the flows, the concentration gradient of the electrolyte in the cathode film is found to be:

$$-\frac{dC}{dx} = \frac{I/FA}{D/t_2}$$

where C is the electrolyte concentration, x is distance measured from the cathode, I is the current, A is the surface area of the cathode, D is the Fick's law diffusion coefficient (distance squared per second) and t_2 is the transport number of the anion. The assumptions required for the derivation are:

1. The activity coefficients of the anion and cation are equal, permitting the use of the mean activity coefficient.
2. The derivation is based on a single electrolyte whose ions have the same valence, although the theory is not limited to these electrolytes.
3. There is no appreciable water flow.
4. The activity coefficients are assumed constant over short ranges requiring the use of point to point calculations.
5. The interaction coefficients are negligible.

Integration of the above equation for the concentration gradient, assuming D/t_2 constant, leads to the familiar Wilson and Youtz equation. This substantiates the present theory since the two are derived by independent approaches to the problem. The Wilson and Youtz derivation requires the assumption of a linear concentration gradient and also that activities are equal to concentration which was not required in the present theory. In addition, the present theory describes the flows of each of the constituents of the electrolyte so that more information is known about the amounts and directions of flows of the anion, cation and undissociated molecule.

Experimental data on the cathode film concentration gradient were obtained for hydrogen deposition from hydrochloric acid, copper from copper sulfate, silver from silver nitrate and hydrogen from acetic acid. The electrolytic cells were specially constructed to minimize convection so that at steady state, the cathode film, instead of being about a half a millimeter in thickness, was in the order of twenty-five centimeters. To obtain this increase it was necessary to operate the cells over a period of several months to insure that a steady state was approached. The data on each of the systems agreed very well with the theoretical predictions with the exception of acetic acid. The disagreement was felt to be due to the interference of convection rather than disagreement with theory.

86 pages. \$2.00. Mic 57-2758

DETONATION PRESSURES OF STOICHIOMETRIC HYDROGEN-OXYGEN MIXTURES SATURATED WITH WATER AT HIGH INITIAL TEMPERATURES AND PRESSURES

(Publication No. 21,921)

Paul Lewis McGill, Ph.D.
Syracuse University, 1957

The purpose of this investigation was to measure the detonation pressures of high temperature, high pressure hydrogen-oxygen-water mixtures, and to compare the results with parameters calculated by means of existing detonation theory.

Most previous work on the detonation of gases has been limited to velocity measurements in the low pressure region. This study was undertaken so that pressure measurements could be obtained which would be of use in high pressure equipment design. The mixtures studied, stoichiometric hydrogen-oxygen saturated with water vapor, are of particular interest in the homogeneous nuclear reactor field.

Measurements were made at three initial temperatures: 25°C, 150°C and 200°C. Initial pressures varied from 1 atmosphere to over 60 atmospheres. Theoretical calculations were made with the aid of an electronic computer, which covered the wider range of 25°C to 300°C and 1 atmosphere to 150 atmospheres.

The experimental apparatus consisted of a heavy-walled detonation tube, fitted at one end with a high pressure spark plug, and with a pressure sensing device at the opposite end. Reflected, rather than incident, wave pressures were measured. The pressure sensing devices used were a piezoelectric crystal, to which the reflected pressure was transmitted by a piston, and a strain gage transducer.

The reflected wave pressure measurements obtained were approximately 25% to 84% of the theoretical values. This apparent discrepancy may be attributed to two factors. First, neither of the pressure gages formed a truly rigid surface for reflection of the incident detonation waves since movement was necessarily involved in the functioning of both gages. This effect was most evident at the lower pressure levels. Second, it was found that the ratio of measured pressure to theoretical pressure was an inverse function of the water vapor content of the initial gas mixture. Because water vapor is known to have a strong rate depressing action on hydrogen-oxygen explosions, it was postulated that water vapor also lowers the reaction rate in detonation waves so that equilibrium is not attained in the extremely short time available. In addition, the experimental data indicated that this rate retarding effect was appreciable even when the initial hydrogen-oxygen mixtures was dry.

Unfortunately, the relative magnitudes of these two factors are not known. Therefore, the correlation of detonation pressure as a function of water vapor content must be considered as qualitative, to some extent, rather than quantitative.

104 pages. \$2.00. Mic 57-2759

PLATE EFFICIENCIES FOR ABSORPTION AND DESORPTION IN A BUBBLE-CAP COLUMN

(Publication No. 21,677)

Lawrence Alfred Warzel, Ph.D.
University of Michigan, 1955

Plate efficiencies were determined for absorption and desorption of ammonia and carbon dioxide with air and water in a multiple-plate, bubble-cap column. Mass flow rates, froth height, pressure drop, absolute pressure, temperature, clear liquid height on the test plate, and liquid and gas compositions were recorded. Visual observations of liquid flow patterns on the plate were made.

The purpose of the investigation is to determine the effects of operating variables upon plate efficiency for a small column when liquid phase reactions have no effect upon the rate of transfer and the major resistance to mass transfer exists in either the gas phase or in the liquid phase. Consideration is given to the application of the results to other tray designs.

The bubble-cap column contained five plates at 18-inch spacings with nine 1-1/2-inch bubble caps per plate arranged in a square pitch of 2-1/2-inch centers. Each cap contained eighteen 1/8-inch by 3/4-inch slots which extended to the tray floor. The plate was 7-1/2 inches wide by 13 inches from the downcomer to the overflow weir. Operating data for a 2-inch and 3-1/2-inch overflow weir are reported where a baffle prevented the splashing of froth over the weir. One side of the column was covered with glass to permit observation.

Water rates of 0.6 to 4.5 gallons per minute per inch of overflow weir and air rates of 0.9 to 4.7 ft/sec superficial velocity based on the area between the downcomer and splash baffle were investigated. Solute concentrations were low but at convenient levels for analysis.

The efficiency data are correlated by the two-film theory when the effects of liquid mixing on the bubble plate are considered. For partial mixing of the liquid on small bubble plates, a simple flow mechanism is proposed to relate point efficiency to plate efficiency for gas-phase controlling systems, and the number of liquid-phase transfer units to plate efficiency for liquid-phase controlling systems.

Murphree vapor plate efficiency E_{MV} for ammonia increases with overflow weir height, increases with liquid rate, and decreases with an increase of gas rate except for high liquid depths on the plate. The values of E_{MV} varied from 74 to 96 percent. Gas-phase resistance is a function of gas rate and froth height when system properties are constant. Height of the gas-phase transfer unit is approximately constant for a constant superficial gas velocity but decreases for an increase of gas velocity.

Murphree liquid plate efficiency E_{ML} for carbon dioxide increases with overflow weir height, increases with gas rate for the higher water rates, and decreases for an increase of water rate. The values of E_{ML} varied from 41 to 90 percent. Liquid-phase resistance is a function of liquid rate, length of liquid flow path across the tray, froth height, and froth density. The number of liquid phase transfer units for a plate can be estimated from froth density and net liquid velocity across the tray. Liquid mixing determines the relation between the transfer units and the liquid plate efficiency. 240 pages. \$3.10. Mic 57-2760

ENGINEERING, CIVIL

THE DETERMINATION OF MOMENTS AND DEFLECTIONS IN PLATES BY THE MOIRÉ METHOD AND BY FINITE DIFFERENCES WITH APPLICATION TO THE SQUARE CLAMPED PLATE WITH SQUARE CUTOUTS

(Publication No. 21,664)

William Arthur Bradley, Ph.D.
University of Michigan, 1956

The aims of this study are: a) to verify that with relatively simple equipment, the moment distribution and the deflection of slabs can be accurately found experimentally by the Moiré method, b) to study by this method the effect of a cutout in a uniformly loaded, square clamped plate on the moment distribution in the plate, and c) to verify the experimental results of the study by the use of an approximate analysis making use of finite differences.

In the Moiré method, the changes in slope, due to loading, of all points of a plate model, are found by first making a photograph of the image of a lined screen reflected by the unloaded plate and then photographing, on the same negative, the reflection from the loaded plate. From the known slopes, it is then possible to determine the curvatures of the model and the bending moments in the plate. Also, by integration of the area under the slope curves, deflections can be found.

In the experimental work, black opaque plastic sheets were used as the model material, and the distributed loading was applied by the use of air cells. Studies were first made of square clamped plates with no cutouts in order to compare experimental results with available theoretical solutions. These plates were loaded with both concentrated and distributed loads, and the agreement was very close, with maximum differences of about five percent. The experimental techniques and the procedure followed in the reduction of the data are described in detail.

In studying the effect of cutouts in the plate on the moment distribution, five plate models were cut from a single plastic sheet. The cutout was centered at a different point in each of these five models. The first tests were conducted with a cutout having a side dimension equal to one-tenth the side dimension of the plate. These cutouts were then successively enlarged until the final one had a side dimension one-half that of the plate. For these various plates, the fringe photographs are presented along with curves showing the distribution of bending and twisting moments.

In the finite difference analysis, approximations to the plate equation in difference form for various points near the cutout were developed. Using these, the moment distribution in one of the plates was calculated. This distribution and also the maximum plate deflections agree well with the experimental results.

From the experimental and analytical work, the following conclusions are drawn. 1) The Moiré method is a valuable experimental tool for determining the moment distribution and deflections in bent plates. With simple equipment, accurate results can be obtained; however, with wider use of the method, techniques will probably be developed which provide greater precision with less effort. 2) The effect of a cutout on the distribution of moments in

a uniformly loaded clamped plate is small except in the immediate region of the cutout. 3) The finite difference analysis gives results which are in close agreement with the experimental results, and when facilities are available for rapidly solving large numbers of simultaneous equations, the difference method may be more economical than the Moiré method. The two methods, either used separately or as complements to one another, make possible the solution of plate problems which have, up to now, defied solution by other methods of analysis.

140 pages. \$2.00. Mic 57-2761

CREEP AND CREEP-RECOVERY OF PLAIN CONCRETE UNDER HIGH COMPRESSIVE STRESSES

(Publication No. 21,818)

Frederic Roll, Ph.D.
Columbia University, 1957

The purpose of the tests conducted at Columbia University was to study the creep and creep-recovery of concrete of various mix parameters under high, sustained, uniformly distributed stresses. A mechanical model was proposed which would represent the observed results, and predict the creep and creep-recovery of different concrete mixes subjected to various stress-levels. No attempt was made to study the effects of the age or size of the specimen, or of variations of environment.

Four series of tests were conducted consisting of three or four different concrete mixes in each series. Stress-levels, varying from 17% to 67% of the 28-day ultimate compressive strength were applied to 10" high cylinders of 3" or 4" diameter over periods varying from 168 to 371 days. All tests were conducted under conditions of controlled temperature and humidity, and shrinkage strains were measured on unloaded control cylinders in the same environment so that creep curves (total time-dependent deformation minus shrinkage) could be obtained.

It was observed that creep is a non-linear function of stress for stresses exceeding approximately 23% of the 28-day strength regardless of mix.

In order to represent the creep and creep-recovery, a mechanical model was conceived consisting of the following elements coupled in series:

- a) a Maxwell element consisting of a linear spring coupled in series with a dashpot which is non-linear with respect to both force and time; this element represents the instantaneous elasticity and the long-time viscous response of the cement paste:
- b) a Kelvin element consisting of a linear spring and dashpot; this represents the delayed elasticity due to the cement paste acting as a restraint on the elastic deformation of the skeleton formed by the aggregate and the cement crystals:
- c) a Kelvin element, non-linear with respect to force; which represents the consolidation effect due to seepage:
- d) a Kelvin element, non-linear with respect to force, which represents the irrecoverable deformation due to localized fracture.

It was assumed that elements (a) and (b) respond to increasing and decreasing forces; element (c) responds to increasing forces, but under certain environmental conditions, may respond to decreasing forces; element (d) responds to increasing forces only.

The model constants were evaluated for the first three test series and the theoretical creep and creep-recovery evaluated. The variation of these constants with respect to mix and applied stress was also determined.

Generalized linear model equations with stress-independent constants for the range of low stresses, and non-linear model equations with stress-dependent constants for the range of high stresses were derived from the condition that the ordinates and slopes of the linear and non-linear creep vs. stress-level curves plotted as a parameter of time were equal at the stress-level $\sigma_0/f'_c = 0.23$. Correspondingly, the stress-dependent constants were assumed to remain stress-independent for stresses $\sigma \leq \sigma_0$, but to vary linearly with stress for $\sigma \geq \sigma_0$.

As a measure of the effectiveness of the proposed model and generalized creep equations and model constants, the expected creep was evaluated for four stress-levels of four mixes and compared with the measured creep results.

To illustrate the use of the proposed model equations, two problems were discussed in which it was assumed that the response was due primarily to the Maxwell element. The first problem refers to the compressive stress-distribution in a beam subjected to simple bending in accordance with the Navier-Bernoulli assumption of beam theory modified for linear strain-rate. The second problem is that of stress-relaxation under an initially applied and maintained constant strain.

123 pages. \$2.00. Mic 57-2762

ENGINEERING, ELECTRICAL

A CATHODE RAY AMPLIFIER TUBE

(Publication No. 21,997)

Kenneth Ward Atwood, Ph.D.
University of Utah, 1957

Chairman: L. Dale Harris

The Cathode Ray Amplifier tube (abbreviated CRA) is a new type of tube. This tube contains an electron gun which directs a beam of electrons between a pair of electrostatic deflection plates. After passing between the deflection plates, the electron beam impinges on a resistor which is mounted inside the tube. The resistor is mounted so the deflection plates can sweep the electron beam up or down the resistor. The position on the resistor where the electron beam strikes is determined by the potential between the deflection plates. One end of the resistor is grounded, and the output voltage is taken from the other end. The output voltage is formed by the electron beam flowing through the resistor to ground. Hence, an output voltage is produced which is proportional to the input voltage on the deflection plates.

As mentioned, the output voltage is proportional to the voltage between the deflection plates. The output voltage

is also proportional to the current in the electron beam. This beam current is dependent on the potential of each element in the electron gun. Thus, the output potential can be made to be a function of several input potentials.

The output potential is proportional to the resistance from point of electron beam impact to ground. The CRA can be made to generate certain functions of an input voltage if the proper type of resistor is used. A different type of resistor would be required for each type of function to be generated.

A working model of the CRA tube was constructed and the characteristic curves were plotted. As expected, the output potential was found to be dependent on the potential of each element in the electron gun. The voltage gain from the working model was quite low (less than two), but since this model was made with an existing type of electron gun, it was not intended to represent the optimum gain. Much greater voltage gains should be possible with proper design of gun and resistor.

From theoretical considerations, the voltage gain and the input impedance characteristics of the CRA tube are derived.

Suggested uses for the CRA tube in DC amplifiers, pulse circuits, coincident circuits, and computers are included. One of the more promising uses is a function generator.

The CRA tube is not intended to replace conventional tubes as voltage amplifiers, but in some of the uses mentioned, one CRA tube can replace several conventional tubes and their associated circuits. Some of the characteristics are unique to the CRA tube. With proper development, the CRA tube should prove to be a useful addition to the electronic devices now used.

106 pages. \$2.00. Mic 57-2763

TIME LAG OF IONIZATION BEHIND ULTRA-SPEED PELLETS

(Publication No. 21,999)

Raymond Alonzo Davidson, Ph.D.
University of Utah, 1957

Chairman: L. Dale Harris

The ionization and light associated with ultra-speed projectiles does not necessarily occur at a point along the projectile path at the instant the projectile passes. This time lag has been measured by letting the projectile and the ionization in its trail obstruct the transmission of microwaves through a short length of wave guide. This paper reports the results of experiments designed to measure the ionization time lag in the trail of ultra-speed projectiles of various materials. Ionization and the accompanying time lag was observed for Magnesium, Aluminum, and Titanium projectiles but not for Copper, Steel, or Zinc. Time lags were measured up to 1,000 microseconds at lower velocities for the different metals. At velocities near 2.5 km/sec., no time lag was observed. The time lag was found to vary for different projectile materials and velocities. Time lag of light and ionization seem to be the same and to be related to the amount of energy necessary to raise the metal in a molten state to the state where it will react with oxygen. 47 pages. \$2.00. Mic 57-2764

A CRITICAL STUDY OF METHODS OF SOLVING POWER SYSTEM TRANSIENT STABILITY PROBLEMS

(Publication No. 21,850)

Sushil Das Gupta, Ph.D.
The University of Wisconsin, 1957

Supervisor: James J. Skiles

In the initial stages of long range power system planning it is often sufficient to determine simply if the system is stable for especially severe fault conditions. However, in more advanced stages of planning and in the analysis of actual system troubles it is quite often necessary to study the protective relay schemes essential for reliable system operation. This requires knowledge of voltages and currents at the generator terminals and at various high voltage switching stations, etc., within the system during the power swings that accompany system disturbances.

The Network Calculator has been used for over 25 years to study transient stability problems. The network analyzer approach to the problem has the very important advantage that the power system may be represented in as much detail as engineering judgment indicates is necessary, and with greatest possible ease. Consequently, the time variation of desired currents and voltages in the system can readily be measured during stability studies. No other method of study yet proposed even compares with the network calculator in the amount of information obtainable from the study. However, network calculator studies of the transient stability problem are slow, laborious and tie up valuable engineering talent in routine computations.

The need for better representation of the electrical characteristics of generators and more detailed information about the power systems during stability studies is established in the thesis. The potential value of digital stability studies in these respects is clear.

The essential content of the thesis is:

(1) A critical discussion of the existing analog and digital methods of solving power system transient stability problems.

(2) Development of the necessary theory and mathematical and experimental techniques to extend digital stability studies to the determination of detailed information on the performance of the system during transient disturbances, including the calculation of complete generator terminal conditions, internal system voltages and currents, and the effects of subtransient synchronous machine losses.

(3) Development of an IBM 650 digital computer program to enable practical application of the important developments of (2).

(4) A systematic study of the effect of errors inherent in digital stability studies.

The investigations reported in this thesis and recent digital stability studies on actual power systems reveal the following advantages of digital studies:

1. Engineers need no longer perform the routine calculations required in the step-by-step network analyzer solution.

2. Human errors that attend step-by-step network calculator studies are virtually eliminated.

3. Generator terminal conditions and system internal voltages and currents for three phase faults are readily determined.

4. The study of the most favorable division of load and spinning reserve generation between two plants from the viewpoint of stability is extremely simple in digital stability studies.

5. For a given system fault location detailed analysis can be made, quickly and inexpensively, of the effect of circuit breaker clearing times on system stability. Reclosing of breakers and the effect of reclosing times also can be studied very easily by digital means.

6. A digital computer can be programmed easily to automatically determine the critical clearing or reclosing time to within any desired degree of accuracy.

7. Digital stability studies appear to be the least expensive procedure when many studies are to be made at one time.

171 pages. \$2.25. Mic 57-2765

AN ALGEBRAIC APPROACH TO THE SYNTHESIS OF EQUALIZERS FOR A PRESCRIBED FREQUENCY RESPONSE

(Publication No. 21,675)

Ju-Ching Tu, Ph.D.
University of Michigan, 1956

The major purpose of this dissertation is to develop a general method for finding transfer functions which approximate prescribed amplitude and phase characteristics.

The minor purpose is to integrate and supplement the numerical methods into a more useful tool for attacking the approximation problem and the realization problem in network synthesis.

Based on the criterion of mean square error, three approximation methods that lead to transfer functions of prescribed frequency characteristics are developed. They are: 1) the rational function approximation method which leads to a transfer function of lower degrees and hence a network of less circuit elements, 2) the polynomial approximation method which reduces the computation time considerably at a moderate increase of circuit elements, and 3) the assigned linear phase-lag method which results in a network of more circuit elements but greatly simplifies the computation steps. The approximation methods are practical in that: 1) no conformal transformation is used, 2) only a fair knowledge of algebra is presumed for understanding and applying them, and 3) either a desk calculating machine or a high-speed digital computer can be used to advantage to perform the numerical computation.

Two examples are solved by different approximation methods to illustrate the detail of the computation steps. The errors in these approximation methods are compared to reveal the relation between computation time and error of approximation.

An improved method of realizing balanced lattice networks is developed for the purpose of simplifying: 1) the numerical computation in the realization process and 2) the introduction of losses to meet the specific quality factor Q of the circuit element to be used. Three examples are solved to illustrate the steps of numerical computation, and the choice of circuit elements of different Q 's.

A novel method of rejecting the right-half p -plane roots of an even polynomial equation up to eight degrees is derived. This method avoids: 1) the solution of the given

polynomial equation, and 2) the formation of the new polynomial equation from the left-half p -plane roots. It determines the coefficients of the new polynomial equation directly from that of the given equation. Several examples are solved by this novel method which show clearly the advantage over the usual method.

147 pages. \$2.00. Mic 57-2766

ENGINEERING, MECHANICAL

HEAT TRANSFER FROM A GAS SOURCE AT TEMPERATURES ABOVE 5,000° K

(Publication No. 21,515)

Ronald Edward Bowles, Ph.D.
University of Maryland, 1957

Supervisor: Professor Charles Alfred Shreeve, Jr.

This thesis examines heat transfer to water from a source which is at temperatures as high as 25,000° Kelvin. To accomplish this study it was necessary to design, build, and test laboratory equipment which could provide the extreme temperatures required under controlled conditions.

As water is heated its character changes from: liquid to steam, to dissociated molecules, to molecular oxygen and hydrogen, to atomic hydrogen and oxygen, to ionized hydrogen and oxygen with the associated free electrons and neutrons. The term "Plasma" is used to describe these water products when there are no molecules present. (This condition only occurs at high temperatures.)

The heat source of this thesis is plasma created by a high-temperature electric arc in a controlled atmosphere. The heat is transferred to a liquid coolant, water which is axially symmetric with and adjacent to the arc. Temperature determination uses a method developed by F. Burhorne, H. Maecher, and T. Peters (ref 20) which requires measurement of arc diameter and current. Heat transfer area has been established from dimensions of the apparatus and photography, while the heat transferred to the water surface was established by measuring heat added to the unevaporated coolant along with the quantity of water evaporated during the test.

The experimental data indicated that for maximum arc temperatures (at the arc centerline) between 13,000° K and 25,000° K the heat transfer varied as $T_{\max}^{4.0}$ which indicates a variation of average plasma emissivity of the form:

$$\frac{\epsilon_1}{\epsilon_2} = \left(\frac{T_1}{T_2}\right)^m$$

where "m" is of the order of 1. Due to the limited temperature range and number of tests the temperature exponent is not firmly established and $T_{\max}^{4.0}$ or $T_{\max}^{5.0}$ are compatible with the experimental data. A best fit line is of the form $T_{\max}^{4.5}$.

Integration of the product: (number of particles at temperature) (T_i^5) over the arc diameter and comparison with an equivalent homogeneous gas volume indicates that the relationship between heat transfer and temperature of a homogeneous gas mass is of the same form as that

between heat transfer and maximum arc temperature for a plasma of the type studied, i.e.

$$\dot{Q}_1 = C_1 \sigma T_{\max}^4$$

$$\dot{Q}_2 = C_2 \sigma T_{\text{ave}}^4$$

where \dot{Q} = rate of heat transfer

C = a constant

σ = Stefan-Boltzman constant

T_{\max} = temperature at the arc centerline

T_{ave} = temperature of a homogeneous plasma

84 pages. \$2.00. Mic 57-2767

THE DETERMINATION OF STEADY FLOW AND PULSATING FLOW PERFORMANCE FOR AN IMPULSE TURBINE WITH PARTIAL ADMISSION

(Publication No. 21,519)

A. Fattah Fakhoury, Ph.D.
University of Maryland, 1957

Supervisor: Professor C. A. Shreeve, Jr.

There were two objectives for this research:

1. The determination of impulse turbine losses in studying the performance in the unit for steady flow runs.
2. The use of the results obtained from the steady flow run losses in studying the performance of the turbine when driven by a pulsating energy source.

In both sets of runs a G.E. turbo supercharger was used which was adapted for a partial admission. For the steady flow runs, the driving source was a centrifugal compressor; while for the pulsating runs, the source was the exhaust of a gasoline engine.

In order to be able to determine the turbine performance for steady flow runs, it was necessary to compute all possible losses. The losses studied were:

1. Heat loss by conduction from the supercharger to the turbine and by convection from the compressor casing to the atmosphere. It may be noticed that the conduction loss includes also the nozzle loss.
2. Windage losses are equivalent to the pumping and mixing losses in the turbine blades due to partial admission, and to disc rotational friction. These losses are a function of turbine speed.
3. Bearing and unaccounted for losses are also dependent on turbine shaft speed.

By choosing runs for different loads at the same speed, one was able to eliminate the losses which were a function of the turbine rotational speed as well as the convection heat losses which did not vary significantly for the same speed, and thus one was left only with the conduction heat losses. By the use of this method the value of a heat conductance coefficient C was determined for each chosen speed. The process was repeated for the turbine speeds under different loadings, and the variation of the conductance coefficient C with turbine speed N was applied in the analysis of heat flow in the case of the pulsating flow runs.

The windage loss, due to partial admission and rotational disc friction, was calculated. The bearing and

unaccounted for losses were found vs. turbine speed by the deduction of the heat and windage losses from the total loss. The relation between bearing friction and the turbine speed was applied in the pulsating flow tests.

The turbine performance, including the various turbine losses, was referred to a graphically determined turbine efficiency. By this procedure, a theoretical nozzle velocity equal to those of the steady flow runs was chosen; the blade velocity was divided into equal increments and for each increment the whirl velocity was found graphically. The divisions of the blade velocity included those that were above or below the design wheel velocities. For each division, however, only the component parallel to the blade inlet angle was taken for the determination of the outlet gas velocity and whirl velocity.

As for the second objective, namely the determination of the pulsating flow turbine performance, the pressure waves and the energy accompanying them through the engine exhaust pipe and the turbine nozzle were calculated. Then, by the use of the steady flow results, allowance was made for both the bearing friction loss and the heat gain or loss. With this information, the efficiency of the turbine under pulsating flow was evaluated.

The pulsating turbine efficiency conformed very closely with the corresponding theoretical turbine efficiency when allowance was made for the previous losses, the turbine blade coefficient, and for the losses due to the variation of jet angles from the nozzle.

132 pages. \$2.00. Mic 57-2768

THE INFLUENCE OF METHOD OF JUNCTION FORMATION AND HEAT TREATMENT ON THE ELECTROMOTIVE FORCE PRODUCED BY A THERMOCOUPLE

(Publication No. 21,864)

Elbert Brunner Reynolds, Jr., Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor W. R. Marshall, Jr.

The objective of this investigation was to determine the effects, if any, of method of junction manufacture, or formation, and heat treatment on the electromotive force (EMF) produced by a thermocouple. Two metal combinations, iron-nickel and chromelalumel, were used to see if a combination of pure metals were affected in the same way as a combination of alloys by method of junction manufacture and heat treatment.

The methods of junction manufacture used in this investigation were: (1) twisting, (2) pinch welding (spot welding), (3) silver soldering, (4) acetylene welding. Heat treatments used were: (1) none, (2) annealing at 650°F for twelve hours, (3) annealing at 1250°F for twelve hours. The temperatures to which the thermocouples were subjected in the test work ranged from -300°F to 1000°F. At all temperatures except -300°F the thermocouples were tested in an electric furnace. At -300°F the thermocouples were immersed in a liquid air bath.

The test results indicated that the differences in EMF of thermocouples made by different methods were, at a given temperature, small and not reproducible. At any

temperature between 32°F and 1000°F the greatest EMF difference between chromel-alumel thermocouples made with the various junction types was equivalent to about 3.5°F; between 32°F and -300°F the greatest EMF difference was equivalent to 5°F. The corresponding figures for iron-nickel were 6°F and 10°F.

The temperature differences equivalent to the differences in EMF between thermocouples made with the various type junctions were at least as large for the iron-nickel as for the chromel-alumel thermocouples. Therefore, the commercially pure metals iron and nickel did not produce thermocouples giving more uniform EMF than did the alloys chromel and alumel.

The conclusion was drawn that all thermocouples must be calibrated if deviations from thermocouple to thermocouple of 5°F in the temperature range investigated cannot be tolerated for chromel-alumel thermocouples, or 10°F for iron-nickel thermocouples.

166 pages. \$2.20. Mic 57-2769

THE FUNDAMENTAL VARIABLES AFFECTING THE OPERATION OF WET TYPE DUST COLLECTORS

(Publication No. 21,679)

John Latta Wighton, Ph.D.
University of Michigan, 1956

The purpose of this investigation was to develop relations for estimating and comparing the collection efficiencies and pressure losses of wet impingement type dust collectors. The equipment and operating procedure were chosen to eliminate or render negligible all collection mechanisms except inertia. The work was based on a dimensional analysis of the variables involved in collection by inertia, including the geometry of the equipment, and

the properties of the dust particles and of the conveying gas stream. The properties of the collecting fluid were not included as variables, since water at room temperature was the only liquid used.

The equipment built for the project represented a vertical slice from a pilot plant size collector. The front and back were made transparent so the action would be visible. A dirty air stream containing a well dispersed and closely sized dust was impinged at high velocity upon the water surface of the collector. The cleaned effluent gas was passed through a very high efficiency filter, and the penetration of the collector was determined from the weight of dust caught on this filter.

As the different variables were varied, one by one, significant differences occurred in the penetration. When the data were plotted on logarithmic paper, straight lines were obtained, permitting the evaluation of the constants of the dimensional analysis.

A satisfactory pressure loss correlation was obtained in terms of the collector geometry and the Reynold's No. The constants of the equation do not apply to all types of equipment.

A relation was obtained for penetration in terms of collector geometry, Reynold's No., and particle size. Specific gravity, sphericity, and wettability are not included, and the relation cannot be considered a true correlation. Most of the constants in the relation depend upon the particular dust being tested and on the geometry of the equipment.

If suitable adjustments are made it is shown that the Reynold's No. used in the experimental work can be transformed into the parameter ψ which has been proposed to characterize collection by inertia. The correlation in terms of Re. was selected as better adapted to the proposed line of investigation.

Preliminary work showed that the penetration of the collector was independent of concentration of dust in the dirty air stream. It is believed that this is due to excellent dispersion of the dust by the dust feeder that was designed for the project.

142 pages. \$2.00. Mic 57-2770

REINFORCED CONCRETE AND THE ARCHITECTURE IT CREATES

(Publication No. 21,123)

Aly Ahmed Raafat, Ph.D.
Columbia University, 1957

Reinforced concrete is inaugurating a new architectural style. As a structural material it has unique and inspiring characteristics. Its monolithic, plastic, and tensile qualities offer fresh avenues of form and expression.

This dissertation attempts to analyze these avenues, to set a sense of direction for them, and to bridge the apparent existing gap between technical knowledge and architectural creation. A thorough survey of existing literature has made this task all the more necessary. While a large number of references exists on the structural and technical aspects of reinforced concrete, few exist on its architectural aspects, and none have been published since the year 1928.

In its first part this dissertation deals with early technical and architectural approaches to reinforced concrete. The pioneering and developmental stages of its technical progress are discussed in chronological order, beginning with October 27, 1854 when W. E. Wilkinson of Newcastle-on-Tyne obtained Great Britain Patent No. 2293 for the construction of concrete floors reinforced with iron ropes. The relatively unknown American contribution to the pioneering stage is pointed out in a discussion of the achievements of T. Hyatt of New York and W. E. Ward of Portchester, New York.

While skeleton construction was the structural approach to reinforced concrete, eclectic styles were its architectural dressings. A wide gap between engineering and architectural approaches continued through the twentieth century up to the present.

Until recently, architecture has failed to take the fullest advantage of the scientific development of concrete in its materials, methods of production, and design innovations. The discussion of these and related subjects forms the second part of this dissertation.

The third part develops the concept of concrete archi-

ture as a means of achieving stable structures which manipulate space in the most delightful form. Structural concepts made possible or easier by reinforced concrete are discussed from the viewpoint of architectural form. A series of such forms, starting with post and lintel structural arrangements and extending to the ultimate continuous monocoque forms, are described. From this, it is apparent that reinforced concrete has pushed architectural forms more toward this ultimate.

Such new structural forms offer architectural manipulation of space both possibilities and limitations. A survey of these in different stages is here attempted. Necessary adjustments in the variable inflexible and closed plastic forms, to adapt them to various architectural conditions, are stated and explained.

For the aesthetic side of reinforced concrete architecture, this dissertation attempts to establish and approach built on the concept that the aesthetic body is of three levels: "aesthetic surface," "the form," and the "expression" or "substance." Potentialities of reinforced concrete as an aesthetic surface, in color and texture, are discussed. The role of aggregates, pigments, and formwork in changing the indefinite, cold, and non-uniform natural color and texture of concrete is stressed. The problem of lack of means of perception and conception in plastic forms is put forward. The employment of cuts, openings, and form combinations is offered as a possible solution. The very nature of reinforced concrete as a plastic material strong in compression passing through a certain process of manufacture and assembled in certain structural forms offers many channels for architectural expression. These have been pointed out by actual examples or by sketches and designs put forward to supplement the theoretical approach.

It is hoped that through an architectural approach to reinforced concrete, based on the previous analysis of its potentialities, a period of true participation by the architect in its development can be brought about. It is only with such architectural understanding and confidence that true maturity of the style can be hoped for.

369 pages. \$4.75. Mic 57-2771

FOOD TECHNOLOGY

THE ENERGY EXPENDITURE OF GIRLS 12 TO 14 YEARS OF AGE ENGAGED IN ACTIVITIES USING THE RESPIRATION CHAMBER AND THE KOFRANYI-MICHAELIS APPARATUS

(Publication No. 21,773)

Mary Misko Becker, Ph.D.
Columbia University, 1957

The study of the energy requirement of children has been of interest for many years. Although energy expenditure data on children of various ages have been obtained, similar data for girls in the 12- to 14-year old group are incomplete. It was therefore considered desirable to determine the energy expenditure of girls in this age group when walking at a moderate speed, and when engaged in bedmaking, sitting and sewing, and undressing and dressing. Ten normal healthy girls from a nearby school were selected as experimental subjects. The open circuit respiration chamber was used for the investigation of the energy expenditure for the activities of sitting and sewing and undressing and dressing. The portable Kofranyi-Michaelis apparatus was used for the activities of walking at a moderate speed and bedmaking.

An average basal metabolism of 1.20 Calories per kilogram per hour was obtained for the ten girls. This value is in good agreement with standards proposed by Talbot, Lewis, Duval and Iliff, and Dreyer for girls of this age.

The average Calorie expenditure per kilogram per hour was 1.86 for sitting and sewing and 3.17 for undressing and dressing. These activities were carried out in the respiration chamber. The average increase in energy expenditure over the basal metabolism for sitting and sewing was 56 per cent, and for undressing and dressing, 165 per cent.

The results obtained using both the relatively new Kofranyi-Michaelis apparatus and the standard Benedict Knapsack apparatus for measuring the energy expenditure of walking were in good agreement. Since the Kofranyi-Michaelis apparatus offered practical experimental advantages over the Benedict Knapsack apparatus and gave reliable results, it was used for the determination of the energy expenditure for walking at a moderate speed and bedmaking. The average value obtained for 18 tests on walking at a moderate speed was 3.95 Calories per kilogram per hour. The average of 23 bedmaking experiments was 3.24 Calories per kilogram per hour. The energy expenditure increase of these activities above the basal metabolism are 226 and 168 per cent, respectively.

57 pages. \$2.00. Mic 57-2772

EFFECTS OF ULTRASONIC WAVES ON THE HEAT STABILITY AND FLAVOR OF MILK

(Publication No. 21,866)

David Richard Shenkenberg, Ph.D.
The University of Wisconsin, 1957

Supervisor: Associate Professor William C. Winder

The application of ultrasonic waves to milk processing has been investigated to a limited extent over the past 20 years. Most investigations have been concerned with degassing, homogenization and bacterial destruction. This investigation was undertaken to study the effect of ultrasonic treatment on the heat stability of milk and on flavor production in milk.

The stability of milk or concentrated milk to heat is a problem of major concern in concentrated milk products. The heat stability is dependent upon two major factors: 1) the composition of the products and 2) the temperature history of the milk.

The treatment of whole milk with ultrasonic waves did not change the heat stability of the whole milk. Treatment of 26% total solids concentrated milk with ultrasonic waves did increase the heat stability of the concentrated milk under certain conditions. Concentrate which had been subjected to a high forewarming temperature and subsequently stored at 2°C for two days exhibited an improvement in heat stability after ultrasonic treatment. Treatment was more effective at low energy levels than at high energy levels in improving the heat stability. The heat stability of concentrated spring and summer milk could be improved as a result of ultrasonic treatment but concentrated winter milk was unaffected. The improvement in heat stability of certain concentrated milks is attributed to the agitation resulting from ultrasonic treatment which breaks the fragile gel formed in forewarmed concentrate during storage at low temperatures.

The flavor of milk is of paramount importance to the consumer and processing must not cause flavor deterioration. Ultrasonic treatment of milk produces an undesirable flavor which has been described as resembling the flavor of hot oil. This flavor has also been called oxidized, talloxy, burnt, etc. Flavor development is much more pronounced after ultrasonic treatment at a frequency of 400 kc than after treatment at 1200 kc. Flavor development was found to take place after treatment at very low energy levels, and the intensity of flavor development was proportional to the amount of energy applied to the sample.

The flavor compound precursor appears to be some minor constituent of the serum portion. The precursor is probably some low molecular weight nitrogen compound. However, the flavor precursor has not been identified in this investigation.

The flavor compound itself is very volatile and of low molecular weight. Once formed, it can be removed by filtering with activated charcoal, dialysis, vacuum refluxing and by steam distillation. The presence of fat and/or

solids not fat in milk appears to mask the presence of the "hot oil" flavor.

Ultrasonic treatment does not affect the pH or formol titration values of boiled acid whey. "Hot oil" flavor production does not correlate with oxidation of the fat, and addition of ascorbic acid to the sample prior to treatment does not inhibit formation of the flavor compound. An unknown chemical or physical change is suggested as being

responsible for conversion of the precursor into the flavor compound.

The flavor compound can be separated from water in which it has been trapped through the use of gas chromatographic analysis. A distinct, separate peak appears in the analysis. The "hot oil" flavor compound was not identified in this investigation.

112 pages. \$2.00. Mic 57-2773

GEOGRAPHY

THE MONTAGNA PISTOIESE: POPULATION-SUPPORTING CHARACTERISTICS OF AN ITALIAN APENNINE REGION

(Publication No. 21,601)

Delmas A. Bugelli, Ph.D.
Columbia University, 1957

The Montagna Pistoiese, in the northern Apennines of Tuscany, provides an opportunity to investigate and analyze the effect of resource limitations on land-use patterns and population-supporting characteristics in a small mountainous region. This is one of numerous Italian areas exhibiting highland depopulation tendencies.

Field work, library research, and utilization of various written materials from other sources are the basic techniques used.

Directly or indirectly, the region's early settlements and a long sequence of historical events have left their impress on prevailing land-utilization systems. Population and economic structures, nevertheless, are closely related to natural environmental conditions.

The Montagna has extremely detailed surface configuration. Minutely carved mountain ranges are the predominant land form. Climate combines features of Mediterranean and severe winter continental regions. Rapid surface run-off causes destructive flash floods. Earth slides are a prominent landscape motif. Soils are essentially sandy. Beech and chestnut trees dominate a woodland cover rendered incapable, mainly by indiscriminate cutting, of arresting soil degradation. Soil erosion is a major problem.

Farming is the occupation of most of the Montagna's inhabitants. The primary focus is upon livestock, hay, wheat, potatoes, and chestnuts. Simple methods, terraces, inadequate fertilizer utilization, and small yields are noteworthy characteristics. Fragmentation of holdings is described locally as "pulverization." Chestnut groves are being destroyed by the disease *Endiothia parasitica* and by ill-advised cutting operations. Inhibiting influences of traditional farming methods, financial difficulties, and the pressing need for improvements in farm tenure and land utilization accentuate the farmers' plight. Additional critical factors are unproductive soils, insect pests, plant

diseases, unprotected watersheds, remoteness, and inaccessibility.

Among the Montagna's nonagricultural activities, woodland utilization is handicapped by failure to appreciate fundamental relations between vegetation cover and land and by the nonexistence of an official consensus regarding future land utilization planning. Weather vagaries make recreational activities an unreliable income source. Manufacturing, a subordinate activity, is concentrated in three plants producing metal, electrical, and paper products. Numerous family workshops underline the economy's subsistence nature. The trade pattern, and the transportation system integrating it with regional economic activities, reveal fundamental weaknesses of the larger manufacturing establishments which rely heavily on outside raw materials and markets. Despite marked self-sufficiency, some food products must be imported. General inadequacy and inefficiency of transportation facilities in out-of-the-way districts localize intraregional trade and discourage interregional exchange.

The available evidence points to maladjusted relationships between the Montagna's inhabitants and their mountain habitat. Deterioration of the resource base and declining productive capacity have encouraged farm abandonment and depopulation. Yet, certain changes might discourage out-migration. Housing, transportation, school, medical facilities and other community services could be improved. Tax reform, extension of credit facilities and consolidation of fragmented holdings are needed. Benefits in the farm economy could be derived by shifting emphasis from grains to hay and livestock. Afforestation and extension of labor-intensive light industries would strengthen rehabilitation efforts.

Since other regions of mountain depopulation may have a higher priority on Italy's list of rehabilitation areas than the Montagna, it is impossible to make an exact prediction on the outcome of the dilemma. If no remedial action is taken there will be continued, probably accelerating, depopulation. If some, or all of the restorative measures indicated for the Montagna's economy are adopted, regional poverty and depopulation could be greatly reduced or permanently halted. A decisive factor is the extent and nature of the montanaro's own willing participation.

307 pages. \$3.95. Mic 57-2774

GEOLOGY

STRUCTURE AND PETROLOGY OF THE ORACLE GRANITE, PINAL COUNTY, ARIZONA

(Publication No. 21,870)

Anil K. Banerjee, Ph.D.
University of Arizona, 1957

Supervisor: Professor E. B. Mayo

Oracle granite, probably emplaced in older Precambrian time contains the relic pattern imposed on the Pinal schist by the Mazatzal orogeny. The "granite" of that time was a granodiorite. It is now a porphyritic quartz monzonite that varies unsystematically toward granodiorite and biotite granite. The trend of its principal Precambrian foliation is northeast-southwest and this is crossed by northwesterly-trending Precambrian foliation.

After the Mazatzal orogeny, peneplanation, and deposition of the younger Precambrian Apache group, a series of dikes was emplaced in the Oracle granite, beginning with coarse and medium grained diabase and ending with andesite and rhyolite. The earlier members of the sequence, including diabase, aplite, pegmatite, quartz and latite were emplaced when tensional stresses opened a series of northwest trending fractures. The tension seems to have been related to right lateral strike-slip along the Mogul fault zone, which forms the southern border of the granite.

In Jurassic or Cretaceous time the strike-slip on the Mogul fault was reversed; northeast-trending Pinal schist south of the fault was rotated counter-clockwise into partial parallelism with the fault, a transition zone north of the fault was likewise dragged and andesite and rhyolite dikes were emplaced in northeast-trending "feather fractures."

The structural and petrographic evidence suggests that metasomatism was important in the origin of the Precambrian granodiorite, but the existence of some magma cannot be precluded. Likewise the evidence suggests that the potash metasomatism that changed the granodiorite to quartz monzonite may have taken place at the time of the later intense movements, that is, during Jurassic or Cretaceous time. However, an earlier age of potash introduction is not unlikely. 155 pages. \$2.05. Mic 57-2775

THE ATOKA FORMATION ON THE NORTH SIDE OF THE McALESTER BASIN

(Publication No. 21,970)

Jack Gordon Blythe, Ph.D.
The University of Oklahoma, 1957

Major Professor: Carl C. Branson

The Atoka formation of the shelf area of northeastern Oklahoma is a lithologic complex characterized by intricate

facies changes as a result of multiple source areas and varying degrees of tectonic behavior in source areas and depositional sites.

Three major source areas are evidenced: the Ouachita Mountain area of southeastern Oklahoma and southwest central Arkansas; the Ozark Uplift in northeastern Oklahoma, northwestern Arkansas, and southern Missouri; and the cratonal area to the north and northwest in northern Oklahoma and Kansas.

The Atoka units of the McAlester Basin area include great accumulations of shale and are believed to constitute a molasse type deposit from the Ouachita area. Much of the thinner portions of the shelf section of the Atoka formation involve sediments derived from the Ozark Uplift to the east and the cratonal shores to the north.

Exposures of the shelf facies of the Atoka formation in Wagoner and Mayes Counties, Oklahoma, have been differentiated, for purposes of mapping and description, into units adapted from the member designations of the Muskegee-Porum area south of the Arkansas River. These units are, in ascending order, the Coody-Pope Chapel sandstones, the Georges Fork-Dirty Creek sandstones, the Webbers Falls member, and the Blackjack School member.

Many lower and middle Atoka sandstones are subgraywackes, although the Pope Chapel sandstone of the shelf area exhibits a greater degree of sorting and a closer approach to a shelf type "blanket" sand than other units. Georges Fork-Dirty Creek sandstones are subgraywackes which accumulated on a somewhat unstable shelf area. The Webbers Falls member attests to clearing seas and a low-lying source area. The uppermost Atoka unit, or Blackjack School member, is a micaceous sandstone deposited in the Atoka seas during their maximum northward extent. The progressive northward advance of Atoka seas is evidenced by the overlap northward of younger Atoka units beyond older members.

A prominent unconformity at the base of Atoka strata is believed to correlate in time with the Wichita orogeny of southern and southwestern Oklahoma. A time break at the top of the Atoka section is not readily apparent in the field, but may be inferred from faunal evidence.

The most significant faunal elements for identifying Atoka strata are fusulinids, with certain species of *Fusulinella*, *Fusiella*, *Profusulinella*, *Eoschubertella*, and *Pseudostaffella* indicative of Atokan age. Cephalopods, such as *Pseudoparalegoceras williamsi*, and other forms, hold promise as Atokan age delineators.

The Atoka formation includes numerous oil-producing sands, known as Dutcher and Gilcrease, in the subsurface of eastern and east-central Oklahoma. These sands are markedly lenticular, so that localized and highly variable production characterizes areas of Atoka fields.

185 pages. \$2.45. Mic 57-2776

THE GEOLOGIC STRUCTURE OF THE CAPE FEAR AXIS AS REVEALED BY REFRACTION SEISMIC MEASUREMENTS

(Publication No. 21,861)

Robert Paul Meyer, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor G. P. Woollard

Ten geophysical refraction seismic determinations in the offshore area adjacent to Cape Fear, North Carolina, and in South Carolina were made in 1954 by members of the University of Wisconsin, Geology Department, Geophysics Section. Five of the determinations made in the near-shore area of South Carolina and Georgia in 1955 are also reviewed. These measurements reveal the attitude and depth of the supposed pre-Cretaceous basement surface and permit correlations to be made between stratigraphic interfaces as known on land and velocity interfaces as measured at sea. In part, modifications of the standard deep water techniques have been used in that explosion times were recorded directly and that four seismometers were placed in a line on the bottom of the sea. The latter entailed special surveying precautions to keep all seismometers and explosions on a geographical line.

The results reveal that the structural relief of the Cape Fear Arch in the shelf area is greater than in the adjacent land areas and that the slope is greatest on the north flank of the Arch. Present data reveal no major faults such as had been suggested by others from comparisons of this Arch with a supposedly similar area known to be faulted in the James River region of Virginia. However, the possibility of major faults in the Cape Fear region still exists in areas not yet surveyed. Minor reverse dips are present near the crest of the Arch. In the seaward direction there was found an abrupt increase in dip apparently of the basement surface. This appears to be a characteristic of the entire eastern coastal plain. If this increase in dip represents the intersection between two old erosion surfaces, as has been suggested by others, downwarp is indicated, especially to the south of the Arch. This downwarping appears to be of post-Cretaceous age in the land area.

The near coast stations define an uplift along the coast of South Carolina and Georgia partly through a reversal in the normal seaward dip and partly by shallower than expected depths to basement. The suggestion is made that to the north the uplift is associated with possible fault movement, as revealed by earthquake epicenters, and to the south it may be related to an erosional channel cut in pre-Mesozoic rocks, as reported by others. The uplift defined by these measurements has been named the Yamacraw Uplift by the writer. 176 pages. \$2.30. Mic 57-2777

A STUDY OF THE CHINLE-SHINARUMP BEDS IN THE LEUPP-HOLBROOK AREA, ARIZONA

(Publication No. 21,951)

Riley Seymour Smith, Jr., Ph.D.
University of Arizona, 1957

Supervisor: John F. Lance

The Shinarump and Chinle beds were investigated in the Leupp-Holbrook area of northeastern Arizona. Cross-stratification trends and cobble studies suggest a southeastern source for the material. A southwestern source direction is also postulated by the presence of Kaibab fossils, gray quartzite, and granite cobbles. The possibility exists that the granite and quartzite are from the Bradshaw Mountains near Prescott.

Coarse clastic facies in the Lower member of the Chinle show a decrease in quantity and grain size toward the northwest, correlating with the Shinarump findings. Another notable change is the thinning out and disappearance of some of the cliff-forming Upper Chinle units as they are traced southeastward from Leupp to Smith Butte.

The most useful feature for stratigraphic control in the area is a resistant, cliff-forming, porcellanite bed, found at the base of the Owl Rock, the uppermost member of the Chinle formation.

Some of the "limestones" of the Chinle formation in the area were found to be true limestones, but others are marlstones and porcellanites. The lime is believed to have been precipitated by evaporation from shallow, flood plain, lake waters. The soluble salts may have been flushed out by waters from associated streams during flood stage. The silica responsible for the highly siliceous nature of certain Owl Rock units is believed to have been released by the decomposition of reworked volcanic ash and its conversion into montmorillonite. Silica carried by groundwater possibly enriched the already siliceous rocks. The chert is secondary.

Some substantiating evidence is offered for the concept of the Shinarump as a regressive, blanket deposit, and the Chinle as transgressive, upward building deposit.

204 pages. \$2.65. Mic 57-2778

DIASTROPHISM IN THE LIGHT OF THERMAL OSCILLATION

(Publication No. 21,945)

George K. Swinzow, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Caleb Wolfe

Heat is emphasized as the major force in diastrophic events. The possible sources of heat are investigated, and it is concluded that radioactivity is the only possible source of energy which has been available throughout geologic history. An investigation is made of the role played by different radioactive elements in time. It is demonstrated that the order of importance of the various participating radioactive elements was different in the past.

The heat generation of the planet was not accompanied

by correlative heat losses at all times, since the factors which control heat loss vary at different energy levels.

An indirect estimate of the age of the earth was applied as a limiting factor concerning the initiation of variations at the surface of the planet are triggered by differences in exposed lithologies. Erosion is also visualized as a factor influencing variation, and volcanism and hydrothermal solutions are regarded as a means of escape of excess heat energy. The elevation at any point on the surface of the earth is regarded as directly controlled by the thermal condition in the subjacent region. Since thermal conditions are subject to change, oscillations of the land surface and sea bottom results in oscillations of sea level which results in transgressions and retreat of the sea upon the variable land surface of the earth. Various diastrophic events are investigated from the viewpoint of thermal oscillations. Heat accumulation and heat loss produce volumetric changes in the static subcrustal regions and these are revealed by surface changes.

The amount of radioactive heat which is produced varies with the accumulation of sediments and with the erosion of rocks which are rich in radioactive substances.

The compressional aspects of geosynclines are given special emphasis. The presence of large scale plutons in geophysical regions is well known. Batholiths, despite their dimensions intrude the surrounding strata with a minimum of disturbance. This can be explained best by granitization initiated by the blanketing of radioactive heat by

the thick sedimentary cover. The process thus becomes a matter of digestion of the overlying rocks.

The author does not deny the validity of the concept of isostatic adjustment but believes that it is not the major source of movement in Scandinavia and North America which has been attributed to a positive recoil due to the melting of glacial ice. The influence of an ice shield upon the subjacent thermal gradient reinphase changes from the glassy to the crystalline and back to the glassy state, and these changes are largely responsible for the changes in elevation involved.

An interesting case of a rather complicated hypothesis, the convection hypothesis, is tested for its soundness. It is demonstrated that the convection hypothesis is unsound and should be abandoned because of its inconsistency with well known contemporary evidence.

The limitations of quantitative experimentation are primarily due to the unbalanced ratio between the size of man and the earth and between the time span of man and of the earth. The qualitative approach to experimentation is diastrophism appears to be the only possible avenue which can bear fruit and lead us away from the dead end street where experimental tectonics stands at the present time. Such qualitative experiments by the writer are described and are shown to be in harmony with earth phenomena. Such experiments seem to demonstrate the validity of the localized thermal oscillation principle to which the writer strongly subscribes. 182 pages. \$2.40. Mic 57-2779

HEALTH SCIENCES

HEALTH SCIENCES, NURSING

CIVIL LIABILITY AND NURSING: AN INVESTIGATION OF JUDICIAL DECISIONS INVOLVING THE PRACTICE OF NURSING BY REGISTERED NURSES IN THE STATE OF NEW YORK DURING THE FIRST HALF OF THE TWENTIETH CENTURY

(Publication No. 21,726)

Beulah Eglantine Miller, Ed.D.
New York University, 1957

Chairman: Professor Martha E. Rogers

The purpose of this investigation was to demonstrate and analyze the civil liability of registered nurses in connection with the practice of nursing. The study was limited to lawsuits involving the practice of nursing that had judicial decisions published in the law reports of New York State during the first half of the twentieth century. Nurses having been repeatedly warned of an increase in number and scope of lawsuits in connection with nursing practice wanted documented evidence regarding professional liability. A survey of related literature found little had been written in the area of civil liability and nursing. All attempts to include lawsuits other than those published in law reports were unsuccessful. Legally, cases with reported judicial decisions were the only lawsuits deemed

significant. Established methods for case finding were reviewed and a design for finding cases involving the practice of nursing and collecting data were developed.

An exhaustive search for reported cases resulted in finding two lawsuits in which the nurse was a party to the case and 111 cases in which the practice of nursing was involved but a nurse was not reported to have been a defendant. The most frequently named defendant in the 113 cases was the hospital. The courts of New York held the hospital liable in connection with nursing only when the tortious act involved an administrative act. The findings implied that if and when a nurse is sued, the nurse may be held liable as well as the hospital for negligence concerning administrative acts. Where the tortious act involved a professional act in connection with the practice of nursing, the nurse or depending upon the evidence and claim the nurse and physician may be held liable. Although there were no reported cases to establish it as a fact, the findings leave no doubt but that an individual nurse may be solely liable for acts committed or omitted by that nurse.

There were occasions in the 111 cases not naming the nurse a defendant where the judges delivered dicta on the duties of nurses. The courts on these occasions were concerned only with those acts involving direct nurse-patient relationships. There was no case that questioned the legal responsibility of the nurse supervisor, administrator or teacher. The implications were that these persons were agents of the hospital and as such engaged in

carrying out the functions of the hospital rather than practicing nursing. There was no consideration as to whether or not a nurse is liable for the acts of those workers whom the nurse supervises or teaches. However the cases investigated suggest the function of the non-professional worker is or should be administrative in nature. The courts were more concerned with how an act was performed than by whom an act was performed.

If nurses were sued in connection with the practice of nursing with any degree of frequency in New York State, the judicial decisions made were not considered sufficiently significant to be included in the law reports. Although there has been a marked increase in the number of reported lawsuits involving the practice of nursing, the ratio of approximately one reported lawsuit per 1,000 active graduate nurses in New York State during the last ten year period, 1940-1950, is relatively small. Even so, at least half of the damages sought were due to acts that are undisputedly intolerable to providing a minimum safe level of nursing care for patients. However the data also showed that there are activities in nursing where the factors of human error and inadequacy occasionally operate against the judgment of the nurse, and the damages claimed and judgments awarded in these lawsuits were of such amounts as to be a prohibitive financial threat to the individual nurse.

It is recommended that a study be made to determine a means of minimizing or eliminating the occurrence of further negligence in those areas of nursing activity that were involved in the incidents resulting in litigation. Since the cases investigated are law only for the state of New York, it is further recommended that similar studies be made in each of the other states. In order that nurses keep abreast with developments in civil liability and nursing, a study should be conducted to determine a means of annually informing nurses of additional reported lawsuits involving the practice of nursing. At the same time constant effort should be made by nurses and nursing to investigate lawsuits involving the practice of nursing not reported in law reports and of claims involving the practice of nursing that are settled out of court if effective plans are to be developed for avoiding lawsuits and improving patient care. 183 pages. \$2.40. Mic 57-2780

HEALTH SCIENCES, PUBLIC HEALTH

A CRITICAL EVALUATION OF CLAIMS REGARDING THE RELATIONSHIP BETWEEN SOIL COMPOSITION AND HUMAN HEALTH

(Publication No. 21,706)

Kenneth William Iversen, Ph.D.
New York University, 1957

Chairman: Professor H. F. Kilander

The purpose of this study was to critically evaluate the current claims regarding the relationship between soil composition and human health.

The methods used were designed to identify the existing claims; to evaluate these claims by determining their reliability as based on scientific evidence; to summarize the current state of knowledge; and to indicate the areas of needed research. To identify the current claims, all references under the section "Soil, Plant, Animal Relationships" in the Bibliography of Agriculture for 1950 to 1954 inclusive were listed. Those judged applicable by title were read. These claims were evaluated by subjecting them to logical analysis in terms of the available evidence, which was accumulated from the literature in this and related fields, expert opinion, and from the individuals making the claims, by reading and through correspondence and interviews. The current state of knowledge was summarized in terms of What Can Be Believed, What Is Doubtful, and What Is Not True. Indications of research needs were secured by determining the areas where evidence was inconclusive, by isolating the recommendations of authorities, and by surveying the current status of investigations on both the national and international levels.

The conclusions drawn from the study were as follows. Most of the claims being advanced were found to be unwarranted and to result from violations of sound scientific procedure. There is no basis for claiming that foods raised organically possess any significant advantage from a health standpoint over foods raised by conventional methods or that the use of commercial fertilizers is responsible for the increasing incidence of degenerative diseases. Correlations between area deficiencies and the incidence of human ailments do not prove cause, unless all variables are adequately controlled, which seldom has been done, because man's relation to the soil through his nutrition is much less direct than that of plants or animals. Whether introducing mineral elements directly into the diet is more beneficial than securing them from the soil through plant and animal products remains to be determined. Research needs uncovered include the continued accumulation of basic information concerning the effects of soil characteristics on the nutritional quality of food, the pursual of investigations aimed at learning how to use soil of low fertility to produce crops of the highest possible nutritive quality, and the establishment of a world-wide clearing house information service.

210 pages. \$2.75. Mic 57-2781

HISTORY

HISTORY, GENERAL

A HISTORY OF INTERNATIONAL MASTER CHESS: 1851-1914: A STUDY IN MODERN INSTITUTIONAL HISTORY

(Publication No. 21,838)

Bernard P. Kiernan, Ph.D.
The American University, 1957

This dissertation attempts to tell in a coherent and chronological manner the story of master chess from 1851, the date of the first international tournament, to 1914, the outbreak of World War I. The problem is to view this story from the vantage point of the historian rather than from that of the technician, i. e., the chess expert. In doing so, I have attempted to place the history of master chess against the background of certain nineteenth century phenomena in European cultural history, which can be summarized as follows: a cosmopolitanism of a nature not comparable to anything previous in European history; specialism, or the rise of experts in specialized fields, coupled with an increased complexity in institutional organization; and a trend towards increased professionalism in cultural activities.

The dissertation consists of a history, told chronologically, of tournament and match play from 1851 to 1914. This history is not written merely for the purpose of setting on paper a series of tournament and match results. It shows how the international tournament developed from a simple and crude organization in 1851, to a complex and intricate pattern in 1914. It shows how these tournaments increased in number; how their organization was subjected to an ever closer scrutiny; how the number of prizes and the total prize money increased steadily; and how these tournaments moved from the private purview of the chess club into the open air of the public exhibition. This study further shows how the game itself increased in complexity, how its rules became ever more clearly formulated, and how the rules governing play were constantly refined to free the actual play as much as possible from accidental influences. It shows that this growth in the complexity of the game gave rise to a body of specialists, and that chess passed from the hands of the dilettante and the amateur into those of the expert and the professional. In connection with the last, it shows that the chess master before 1914 tended increasingly to be a professional and to depend for his livelihood on individual patronage.

This study also traces the growth of an enormous chess literature, contrasting the paucity of such literature in 1851 with its profusion in 1914. Finally, this study traces the growth of the concept of a world's champion, around whom we find crystallized many of the concepts outlined above; professionalism, specialism, and cosmopolitanism.

In every instance, this study answers in the affirmative the question: did master chess, from 1851 to 1914, exhibit characteristics typical of pre-World War I cultural history, i. e., an international orientation, an increasingly complex

organization, the growth of a body of experts, and the presence of a strong professional influence.

317 pages. \$4.10. Mic 57-2782

HISTORY, MEDIEVAL

THE FOUNDING OF THE KAMAKURA SHOGUNATE, 1180-85: BASED ON THE AZUMA KAGAMI

(Publication No. 21,128)

Minoru Shinoda, Ph.D.
Columbia University, 1957

This study of the founding of the Kamakura Shogunate, 1180-85, is based on the voluminous record of the Shogunate known as the Azuma kagami (Mirror of Eastern Japan). Compiled between 1268 and 1301 in 52 chapters, it constitutes the principal source of information on the founding and the history of the Shogunate from 1180 to 1266. Because of its importance to students of Japanese medieval history, selected translations of the work from the first five chapters covering the period under consideration (1180-85) have been appended to the study.

The founding of the Shogunate was the result of two simultaneous trends of long development. The one was the steady decline of the authority of the Imperial Court, the traditional government. The other was the rise of the warrior class in the provinces, in particular the two families of the Taira and the Minamoto. In the struggle for supremacy between them which began in 1180, the Shogunate under the Minamoto gradually evolved into existence. As the Taira were the most influential family at the Imperial Court and as its power and influence reached into the provinces, especially in Western Japan, the struggle developed into a war of national scope and significance. Therefore, the victory of the Minamoto at Dannoura in 1185 acquired a national significance, giving the victors great influence and power throughout the country and the right to maintain the public peace for the traditional government.

Thus, a war which had begun as a private, feudal struggle between two families ended with the establishment of a de facto government for Japan. In this development it is important to note that although the Shogunate was a new political institution, it represented, on the whole, the best traditions and practices of the feudal society of the provinces and those of the civilian aristocracy of the Imperial Court. It represented, in short, the balance between two essentially different and opposing societies. There was, therefore, no violent overturning of long established institutions and practices. This explains, in large measure, the wide acceptance, strength and permanence of the Kamakura Shogunate.

Such a development was possible because of the unique

background and the conservative nature of its founder, Minamoto Yoritomo. Yoritomo was born and raised in Kyoto where he developed a familiarity with and a strong respect for the traditions of the Court. At the same time, his exile to the provinces during his youth gave him an understanding and appreciation of the customs and ideals of the warrior society. Thus, the Shogunate which evolved into existence during the struggle between the Taira and the Minamoto reflected the dual background and conservatism of its founder and gave to it its strength and permanence. 446 pages. \$5.70. Mic 57-2783

HISTORY, MODERN

EMBATTLED INDIVIDUALISTS: THE DEFENSE OF THE IDEA OF INDIVIDUALISM, 1890-1930

(Publication No. 22,008)

Clarence Buford Carson, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Henry L. Swint

It has become increasingly apparent to historians that momentous changes occurred in the life of the American people in the latter part of the nineteenth and early portion of the twentieth century. The more obvious physical changes--the end of the frontier, the revolution in transportation and communication, the tremendous influx of immigrants from Southern and Eastern Europe, the consolidation of business, the shift from industrial to finance capitalism, the innovation of total war, the ever more extensive use of machine mass-production--have been intensively studied and dramatically described. Less obvious but equally profound changes have occurred in the history of ideas, changes in the ideas, ideals, attitudes, habits of thought, and behavior of the American people. These latter changes are associated in intellectual history with such developments as the triumph of science, the prevalence of Darwinian evolution interpreted as determinism, and the victory of realism and materialism over idealism.

The idea of individualism, one of the major ideas of the American people, was challenged, transformed, displaced, and sometimes repudiated or made impracticable by these new developments. One of the ways to study what happened to individualism during a period when it was under fire would be to study the defense of the idea. That is the method of this work. In order to accomplish this, at least in microcosm, I studied five defenders of the idea of individualism. They are from different fields of endeavor, different parts of the country, represent a variety of general philosophical affinities, and their periods of greatest influence cover the time span from 1890 to 1930. Josiah Royce is the defender of individualism in philosophy, William Torrey Harris in education, Herbert Hoover in government, H. L. Mencken for art and from society, and Harry Emerson Fosdick in religion.

In order to place the defense in its proper context and to account for the various arguments which these men made,

I gave an extensive account of the ideas and developments which were hostile, or thought to be, to individualism. Following this, the major part of the study is devoted to an analysis of the defense which these men made of individualism as found in their published works. I wanted to know the sources of their ideas, the nature of the defense, and the changes which they made in the idea of individualism as a result of new ideas and recent developments. Also, it had to be made clear why they thought individualism was so important and what changes in thought or action would be necessary to preserve it.

Generally speaking, these men realized that recent scientific and technological developments were undermining and destroying the bases of individualism. They defended it by pre-scientific and non-scientific ideas. They opposed force and favored co-operative efforts as a means of preserving individual freedom. All of them believed that the individual is important for himself in the first instance, and that if he is given that freedom necessary for self-realization, he will be of great value to himself and society. It was an article of faith with these men that if the value of the individual were not recognized and respect for him not maintained, the one thing of utmost value would be destroyed. 432 pages. \$5.50. Mic 57-2784

A HISTORY OF THE HULL TRADE PROGRAM, 1934-1939

(Publication No. 22,037)

Power Yung-Chao Chu, Ph.D.
Columbia University, 1957

Franklin D. Roosevelt came into the White House in March 1933, condemning the "outrageously excessive" high rates in the Hawley-Smoot Tariff and advocating a resort to bargaining with other nations under the principle of reciprocal interests. But, with the inception of the New Deal, the Administration showed itself divided on the subject of tariff policy. One wing, led by Secretary of State Cordell Hull, who was unsympathetic to the philosophy of national autarchy and whose predilections favored freer trade, wanted to move in the direction of lowering the tariff walls. Another wing, which was particularly strong in the councils of the NRA and AAA, was committed to high tariffs in order to protect the New Deal experiments in price raising from disturbances abroad. Not until after the dollar was devalued in January 1934, a measure which resulted in an increase of American tariff walls by about 50%, more than enough to compensate for rising domestic prices, did the President acquiesce in sending the Trade Agreements Bill to Congress. Hull's influence in Congress proved invaluable in rolling up large majorities for the bill, which passed the House 274 to 111, and the Senate 57 to 33. When Roosevelt signed it on June 12, a new era in American tariff history opened; for the law was renewed again, again, and yet again.

The legislation authorized the President for three years to negotiate agreements with other countries by which, in return for trade concessions, rates of the Hawley-Smoot Tariff might be reduced as much as 50%. It also provided that tariff reductions incorporated in trade agreements be made generally applicable to the goods of all countries,

except those which discriminated against American commerce. Its principal advantages were that it made possible the lowering of tariffs with less pressure from a lobby of special interests, and in accordance with the requirements of the national economy as measured by the State Department and other official agencies. The Hull policy thus marched in the direction of freer trade while the Democratic Party, amidst a sea of unemployment, did not dare to lower the tariff by domestic legislation.

Secretary Hull pushed his trade agreements program with zeal, and in a little more than five years concluded twenty two pacts, eleven of which were with Latin American countries. Of these the agreements with Canada and with Britain were the most wide-ranging and detailed. Despite intense opposition from some industrial and agricultural interests, Hull's reciprocity movement received warm support from business groups seeking to expand exports and from growers of export crops who sought outlets for their surplus produce.

While the trend of tariff rates was downward from the inauguration of the program in 1934, it remains true that the agreements concluded down to 1939 only slightly modified the rigorous protectionism of the Hawley-Smoot Tariff. Reductions in rates were mostly confined either to specialties not directly competitive with any American product, or to commodities of which the domestic supply was deficient, or to commodities in which American production so dominated the home market that increased imports could have relatively little effect on price. Wherever there appeared danger of a substantial increase in purchases from abroad, import quotas or tariff quotas were imposed. In the great controversial tariff areas, such as iron and steel, duties were little affected. Nevertheless, it was officially estimated that by 1939 the agreements, with the process of generalization, had lowered the general tariff level of the United States by about 29%, as compared with 1933. Of the \$879 million worth of dutiable imports in 1939, 62.7% entered at rates so reduced, providing American producers and consumers with lower-priced materials and finished products. On the average, for the years 1938-1939 as compared with the years 1934-1935, total imports from agreement countries increased by about a fifth, from \$774 million to \$942 million, whereas imports from non-agreement countries increased by only an eighth, from \$772 million to \$868 million. Imports on which concessions were made increased 48%, whereas other dutiable imports increased only 14%. In return, the United States received more than 3,600 concessions, covering approximately 75% of the exports of agricultural products, and about 50% of the exports of industrial products. Total exports to agreement countries increased from \$757 million to \$1,232 million, that is an increase of 62.8%, while exports to non-agreement countries increased from \$992 million to \$1,306 million, an increase of only 31.7%.

Since the inauguration of the Hull trade program, the relative and absolute increase of American exports had exceeded that of its imports. Its failure to achieve a more adequate reduction in American tariffs has been the most important criticism that can be legitimately directed against the program. After nearly six years of trade agreements, American producers still operated, by and large, in a protected domestic market, and the program had done relatively little to disturb them in their shelter. Nevertheless, it did reveal at least some willingness on the part of the United States to give an impetus to the

reduction of world trade barriers by lowering its own tariff duties.

443 pages. \$5.65. Mic 57-2785

TOMORROW A NEW WORLD: THE NEW DEAL COMMUNITY PROGRAM

(Publication No. 22,009)

Paul Keith Conkin, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Henry Lee Swint

From 1933 through 1940 the United States Government constructed approximately 100 communities, including subsistence homesteads, organized rural communities, co-operative colonies, and greenbelt cities. This community-building program originated in the back-to-the-land sentiment of the depression and in long-developing movements for planned land settlement, for city planning and the development of garden cities, and for an increased degree of national economic planning. Although much of the impetus for the first New Deal communities came from reactionary agrarians who wanted a redistribution of wealth-producing property and a wholesale return to the land, the actual direction of the community-building agencies was placed in the hands of social scientists and convinced planners who, in the midst of the depression, wanted to achieve new co-operative or collective institutions to replace what they believed to be an antiquated individualism that had originated in a pre-industrial society. Thus, though a relatively small aspect of the tremendous reform efforts of the New Deal period, the community program was the focus for a sharp ideological clash between the old and new liberalism, or between the extremely individualistic, rationalistic, and, most often, agrarian ideas of the nineteenth-century liberal and the relativistic, naturalistic, collectivistic ideas of the twentieth-century urbanized liberal. The very term "community" became a symbol for the dream of a new society which these new liberals hoped to achieve.

The first New Deal communities were the subsistence homesteads, which were born in the distress and pessimism of the darkest depression days. Based on part-time subsistence farming and part-time industrial employment, they were to provide a permanent refuge for industrial workers and farmers who were squeezed out of an economic system that many people believed would never again attain its 1929 level. These subsistence homesteads communities were begun by the Division of Subsistence Homesteads in the Department of the Interior, under the direction of Milburn L. Wilson, a philosophical, mild-mannered farm economist who desired fundamental social and economic reforms, but who realized the difficulty and slowness of any drastic change involving people. Wilson never doubted that these reforms could, and must, be achieved in a democratic, localized context. Complementing the subsistence homesteads, which were avowedly experimental, were the rural industrial communities initiated by the Federal Emergency Relief Administration, beginning early in 1934. These communities, mostly rural with some dependency on processing industries, were for the rehabilitation of relief clients. They were directed by

Harry Hopkin's assistant on rural relief, Lawrence Westbrook.

In 1935 both the subsistence homesteads and rural industrial communities were turned over to a new, many-faceted organization, the Resettlement Administration, which was administered by the controversial Rexford G. Tugwell. The Resettlement Administration completed the inherited communities and initiated many more of its own, concentrating on two types, the suburban greenbelt or garden cities for industrial workers and all-rural communities for the resettlement of destitute farmers being displaced from submarginal farm lands. These resettlement communities were only a part of a huge Resettlement Administration program which included the retirement of submarginal lands, the development of various land-use projects, the largest rural rehabilitation program in American history, the construction of immigrant-labor camps, and many lesser responsibilities. In the Resettlement Administration the communities were most influenced by the philosophy of Tugwell, an economist and planner who wanted a thoroughgoing reform of American society. He viewed the depression as a final repudiation of the individualistic, *laissez-faire* ideas of the past and as a lever for achieving a public control over the whole economic system. The communities were miniature laboratories of social planning in which the Resettlement Administration officials vainly attempted to mold the settlers into the new, co-operative pattern of the future. But the fervid idealism of Tugwell, which to many seemed to border on radicalism, and the many errors, mistakes, and, most important, extravagances which plagued the Resettlement Administration's community program led to an increasing hostility toward the communities from Congress and from the public.

In 1937 the Resettlement Administration was replaced by the Farm Security Administration, which limited its community program to the completion of existing projects. The ideas and policies of Tugwell remained dominant until 1943. The communities became increasingly embarrassing to the Farm Security Administration, particularly because of a few all-co-operative colonies and a few long-term leases which seemed to threaten traditional land policies. With returning prosperity the old, individualistic society was regaining its hold on the minds of the public, and the precedent-breaking innovations in the communities were regarded with increasing hostility. The communities, and the seeming reluctance of the Farm Security Administration to follow congressional mandates for their rapid liquidation, were focal points in the wartime struggle, in Congress and out, over the abolition of the Farm Security Administration, which was replaced by the Farmers' Home Administration in 1946. Under congressional pressures of all kinds, the rural communities were liquidated by 1947, often without any provisions to preserve the original aims or designs of the planners. The subsistence homesteads and greenbelt communities were transferred to the Federal Public Housing Authority in 1942 and were all liquidated by 1954. A fascinating adventure in idealism and disillusionment was at an end. 587 pages. \$7.45. Mic 57-2786

**SOME ASPECTS OF THE NEW DEAL RATIONALE:
THE PRE-1936 WRITINGS OF SIX OF
ROOSEVELT'S ADVISERS**

(Publication No. 22,010)

Joan Ethelyn Curlee, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Henry Lee Swint

This study is an analysis of the published writings of six persons who were prominent in the early years of the Roosevelt administration: Adolf A. Berle, Jr., Harold L. Ickes, Frances Perkins, Raymond Moley, Rexford G. Tugwell, and Henry A. Wallace. Because of the noticeable shift in New Deal policy in 1935, that year was chosen as the terminal date for this study. No attempt was made to study specific programs or policies, but rather an effort was made to ascertain the fundamental ideas and attitudes underlying the entire New Deal program.

Among such a diverse group there naturally were differences in opinion. Tugwell envisioned a society in which experimental economics had brought abundance for all and the abolition of labor; Wallace wrote of the establishment of the kingdom of God on earth. Ickes, Perkins and Moley were deeply rooted in progressivism. Berle combined a moralistic approach with lucid economic analyses.

Despite their diversity, all the members of this group made significant contributions to the formulation of New Deal policies, and beneath their differences they held some basic beliefs in common.

All the members of this group demonstrated a striking optimism; they all believed that society could be improved. They believed that change, while inevitable, was not necessarily progress, but could become progress if properly directed. They all stressed the importance of an unfettered, experimental approach to all problems; any policy should be judged solely by its consequences. By disregarding traditions and adopting instead a pragmatic viewpoint, Americans could create an economy of abundance and could eliminate most of their economic problems. This new society would assure the economic freedom which was the foundation of other liberties. A necessary part of any such program would be planning, and greater cooperation and coordination would replace much of the traditional competition. Such advances could be brought about only by the adoption of new cooperative attitudes which would stress the essential unity of society and the possibilities of self-realization through efforts for the common good. Extensive government activity would be needed for the attainment of these goals, and the members of this group displayed a strong faith in democracy and in the ability of the people to use the government for the attainment of the goals which they set themselves.

In their discussions both of ultimate goals and of more immediate methods this group demonstrated a close kinship with earlier American reform leaders. In their economics, they echoed the views of Simon N. Patten, the founders of the American Economic Association, and Thorstein Veblen. In philosophy, they were most deeply indebted to John Dewey. Their history was patterned after that of Frederick Jackson Turner, Charles A. Beard, and James Harvey Robinson. Wallace and Berle expressed ideas similar to those of the Christian Socialists. These New Dealers insisted in their writings that recovery from

the depression could come only through basic reforms, and they were bold in suggesting sweeping changes. While they were basically in harmony with earlier American reformers, their approach was more fundamentally economic than that of some earlier leaders.

In their writings these six advisers to Roosevelt indicate that the New Deal was deeply rooted in earlier American beliefs. It is clear, however, that the New Deal had some distinctive characteristics, such as its insistence upon pragmatic tests. Although the New Deal was not a complete rejection of traditional reform sentiment, it was a new adaptation of those ideas to changed situations and needs. 413 pages. \$5.30. Mic 57-2787

THE RUSSIAN PROVISIONAL GOVERNMENT OF 1917

(Publication No. 21,911)

Kenneth Irving Dailey, Ph.D.
Syracuse University, 1957

The purpose of this dissertation is to present a detailed, narrative history of the Russian Provisional Government of 1917. To accomplish this purpose the historical method was used and extensive use was made of source materials in English, French, German, and Russian. Two major aspects of the history of the Provisional Government were deliberately omitted from this study, first foreign policy, for which requisite archival material which would increase our knowledge and permit possible new generalizations is nowhere available at this time; and second, economic developments in business, industry, banking, and transportation.

Because the period studied was essentially a revolutionary epoch following the complete collapse of a whole social and political system, the essence of these days can be most accurately summed up in the one word, chaos. This made the problems of organization and presentation unusually difficult. These problems were met by combining topical and chronological treatments with numerous cross references and "flash-backs". At the same time, an effort was made to avoid not only over-simplification, but also an "over-orderliness" which would have falsely portrayed the real situation.

After an introductory chapter, which sets the stage, attention is given to the organization of the Provisional Government and the Petrograd Soviet. Then the conflicts which beset the Provisional Government are studied in some detail. Considerable attention is given to the events of July, 1917 and to the question of the financial relationships between the Bolsheviks and Imperial Germany. A detailed analysis of the Kornilov Rebellion is attempted. There are detailed chapters on the Provisional Government and the peasants and the Provisional Government and the army. Finally an attempt is made to analyze the reasons for the failure of the Provisional Government to establish a democratic regime in Russia.

587 pages. \$7.45. Mic 57-2788

THE ILLUMINATION REVOLUTION AND THE RISE OF THE PETROLEUM INDUSTRY, 1850-1863

(Publication No. 22,041)

Arnold R. Daum, Ph.D.
Columbia University, 1957

This study has pursued two neglected lines of inquiry into early petroleum history. One examined the development of the industrial arts, especially in the illuminating industries, that conditioned the emergence of a petroleum industry. The second analyzed the coal oil industry, its major innovators, innovating processes, and their impact on petroleum refining and marketing.

Two central themes emerge. One is that developments in technology and marketing before 1860 were indispensable to the subsequent swift rise of the petroleum industry. The second is that these developments were part of a revolution in illumination during the 1850's that without petroleum could have supplied Americans of the next generation with lamp and gas illuminants equal in quality to those they actually received.

Between 1830 and 1850 American illumination experienced its first significant changes from forms and materials that were centuries old. The introduction of camphene (spirits of turpentine) marked the first use of a synthetic oil illuminant and a stronger draft lamp than was required for fatty oils. Adoption of processes to saponify fats by the Cincinnati packing industry improved lard oil as an illuminant and lubricant, and ushered in the superior kerosene candle.

The rapid rise of manufactured gas, beginning in 1845, provided the most potent catalyst for the illuminating revolution of the 1850's. In value of product and invested capital, coal gas manufacture already was the dominant illuminating industry at mid-century; at the end of the decade, the value of its product approximated those of all other illuminants. The revolutionary principle of all modern illumination was firmly established: manufacture in central plants and distribution through pipes or wires.

The impact of expanding railroads, canals, telegraphic communications, and factories, the marked superiority of gas light stimulated an enormous demand for better lighting. This elicited a desire to improve lamp light so that it could better withstand the competitive encroachments of gas illumination. High temperature distillation of coal in gas-making opened the main avenue to the low temperature distillation of coal for lubricants, lamp illuminants, and volatile materials for carbureting or enriching gas in small units. Adapting the technology of coal gas manufacture, the coal oil industry during the second half of the decade carried the revolution full circle. It completed the shift from animal and vegetable sources to minerals as the main base for all illuminants, including lamp oils and candles.

All successful coal oil innovators first lowered the distillation temperatures of gas manufacture, but none moved directly to distilling lamp illuminants. Abraham Gesner preceded distillation of coal oil kerosene for lamps with intensive efforts to score a major success with his product in gas-making. James Young in England, and Samuel Downer and his associates in America, first distilled coal for lubricants. An approximation of a patent pool forwarded the kerosene companies' leadership and influenced competitive relations throughout the coal oil industry. In addition to developing refining techniques,

large scale production of lamps, and national markets transferable to petroleum, the coal oil industry by 1860 had elaborated commercially all the main petroleum by-products of the rest of the century.

A. C. Ferris, innovator of petroleum refining during the coal oil era, foreshadowed the future petroleum industry's preoccupation with illuminants, and its absorption of coal oil technology and markets. Contrary to general belief, petroleum production did not destroy the coal oil industry in 1860. The industry began a gradual conversion to petroleum in 1861 that in by-product manufacture was not completed until 1866. 515 pages. \$6.55. Mic 57-2789

THE PROBLEM OF INDEPENDENCE IN MEXICAN THOUGHT, 1821-1853

(Publication No. 21,790)

Charles Adams Hale, Ph.D.
Columbia University, 1957

Mexico's transition from colonial to independent status was extremely arduous. Upon freeing itself from Spain in 1821, Mexico faced the problem of independence, for which no real solution emerged for thirty years. The aim of this study is to describe the intellectual approaches to this problem of independence as well as to show the relation between ideas and practical policy. The study is based on the social, economic, and political writings of the era, including anonymous pamphlets and unsigned newspaper editorials.

The historical writing of the period centered upon the Revolution for Independence, a decade of violence preceding 1821, during which many future issues emerged. José Mora and Lorenzo de Zavala, the leading liberal historians, viewed the revolution integrally as one continuous liberal struggle against Spanish despotism. The great conservative, Lucas Alamán, saw essentially two revolutions; an early radical and destructive rebellion under Hidalgo and Morelos, followed by Iturbide's constructive and conservative movement of 1821.

The prevailing mood during the 1820s was one of optimism. The early writers and thinkers saw the new nation's great extent, its potential wealth and power, and its acceptance of liberal institutions. The federal constitution of 1824 exemplified the sanguine hopes of many liberals, for they believed that good laws would necessarily ensure social progress. The exceptions to the prevailing optimism were notable. Father Mier criticized the constitution as being too advanced for Mexican society. Lucas Alamán favored a centralist constitution which would continue the strong central control to which Mexico had grown accustomed as a Spanish colony. José Joaquín Fernández de Lizardi, out of tune with his times, was a social critic and premature reformer.

Following the appearance of political anarchy in the late 1820s, the liberals viewed Mexico's problems more realistically. If Mexico was to become a liberal society based on middle-class individualism, it would have to be reformed. The liberals attacked the Spanish heritage, for it persisted as a "colonial mentality" in modern Mexico and presented constant obstacles to progress. They did not believe, however, that the Indian element provided a proper base for

the regenerated Mexico. The country must ideally be dominated by a middle class, preferably small property-holders from Europe. Thus the liberals did violence to the Spanish root of the new Mexico, at the same time that they overlooked the Indian. The country must be reformed without reference to history or to social realities. These ideas were put into action in the ill-fated reform movement of 1833, led by Vice-President Valentín Gómez Farías. Church lands were nationalized, education was made a function of the state, foreign immigration was considered, the army was limited. The inevitable conservative reaction (1834) pushed liberalism underground for a decade.

The economic aspects of the problem of independence were also debated actively. The reformers generally maintained that liberalism required a doctrinaire acceptance of free trade. Others, especially Lucas Alamán and Estaban de Antuñano, attempted to promote native industry which would hopefully make the country less dependent on Europe.

The War with the United States in 1847 accentuated a crisis in Mexican thought. The flagrant defeat dramatized the degeneracy of the nation and both conservatives and liberals reasserted their traditional programs for salvation. The liberals revived the platform of 1833 and called for a general social reform which would eliminate the existing colonial remnants. The conservatives decried the chaos which twenty-five years of republican government had brought the country, and proposed a constitutional monarchy. Out of this national self-criticism came the Great Reform of 1857 and the Maximilian episode of 1863. The problem of independence could not be settled decisively until the triumph of Benito Juárez.

345 pages. \$4.45. Mic 57-2790

ANGLO-IRISH RELATIONS, 1921-1939

(Publication No. 21,914)

Margaret Theresa Halligan, Ph.D.
Syracuse University, 1957

The purpose of this study is to examine in detail the course of Anglo-Irish relations from 1921, when the grant of dominion status to Ireland presumably ended the age-old Irish Question, to 1939, when Eire, alone of the dominions, elected to remain neutral in World War II.

Indispensable sources for the understanding of the political and constitutional problems were the British Parliamentary Debates and the Dail Eireann Debates. The published correspondence of British and Irish Cabinet Ministers who formulated policies furnished an additional source of information. All the essential official papers, treaties, agreements, and statutes were procured from the London and Dublin Stationery Offices. Contemporary periodicals such as The Round Table, The Fortnightly Review, The New York Times, and the London Times proved valuable.

The treaty of 1921 was negotiated after a period of ferocious Anglo-Irish warfare consequent upon Ireland's proclamation of a republic in 1919. At the peace conference the Irish negotiators argued unsuccessfully for a settlement based on de Valera's formula of a united Ireland in external association with the British Commonwealth.

Failing in their objective, they accepted dominion status. The treaty narrowly passed the Dail and was repudiated by the irreconcilable republicans. The schism resulted in civil war which ended in 1923 with a victory for the Irish Free State, as the dominion of the twenty-six counties was called. For five years after the establishment of the Free State de Valera and his party refused to take the oath of allegiance obligatory for Dail deputies.

During a decade of administration by the Cosgrove Government, the Free State scrupulously observed the treaty and tried to reconcile Irish nationalist aspirations with the requirements of British policy. With difficulty, the Cosgrove Government successfully surmounted the opposition to the abhorrent Agreement of 1925 by which partition was made permanent until Northern Ireland and the Free State consented to end it.

A divergence in the evolution of the Irish Free State occurred when de Valera assumed office in 1932. Capitalizing on the Statute of Westminster and endeavoring to woo the extreme republicans, he rapidly eliminated the symbols of British sovereignty. Anglo-Irish relations steadily worsened as a result of the constitutional conflict and the concomitant economic war consequent upon de Valera's retention of the land annuities. A new constitution promulgated in 1937 transformed the dominion of the Irish Free State into the unproclaimed republic of Eire, which conformed in all essentials to de Valera's external association plan of 1921. In the Irish view, Eire was an independent state associated with the British Commonwealth, but not a member of it. In 1938 the Chamberlain Government returned unconditionally to Eire the ports reserved for British occupation under the treaty of 1921 and settled all outstanding issues except partition.

At the beginning of World War II de Valera, summarizing Eire's reasons for neutrality, stated that a war policy during the existence of partition would have so divided Eire as to have been tantamount to national suicide. In 1949 Eire became the Republic of Ireland, with all of her national aspirations realized except one. Partition remains the overriding consideration in all Irish external policies. Great Britain and Ireland today have no conflicting interests, but partition destroys the basis for a policy of genuine co-operation and prevents the termination of the centuries-old Irish Question. 403 pages. \$5.15. Mic 57-2791

SPANISH RELATIONS WITH THE INDIOS BÁRBAROS ON THE NORTHERNMOST FRONTIER OF NEW SPAIN IN THE EIGHTEENTH CENTURY

(Publication No. 21,884)

Elizabeth Ann Harper John, Ph.D.
The University of Oklahoma, 1957

Major Professor: Dr. Max L. Moorhead

The hostile, wandering Indians on the northernmost frontier of New Spain presented a unique problem in Spanish Indian Policy, the solution of which was vital to the survival of her Provincias Internas. Although perfect peace with them was never achieved, during the eighteenth century the Spaniards attained a reasonably stable equilibrium with the forces of the indios bárbaros, which evolved

in distinct stages. Initially, the Spaniards in New Mexico inherited the traditional warring-trading relationship which their Pueblo vassals had long maintained with the neighboring Navajos and Apaches. Early in the eighteenth century the Utes and Comanches pressed in from the north, driving the Apaches from their northern and eastern ranges into the Spanish frontier, where they had to fight for their existence. The New Mexicans faced the twin problems of aggravated Apache hostilities and a bitter war with the Utes and Comanches. The Apaches, driven steadily southward, now began to menace the southern tier of the Provincias Internas. Overwhelmed by the diversity and numbers of the indios bárbaros, the Spaniards survived by playing off Indian enemies against each other. In general, alliance with the amorphous Apache bands proved impracticable. But in the 1720's the Comanche-Ute pressure drove both the Navajos and the Jicarilla Apaches to alliance with the Spaniards. By 1740, the Utes broke with the Comanches and joined the Spaniards. The system of Indian alliances was perfected in 1786 when the Comanches made a firm alliance with the Spaniards in New Mexico. Comanche warriors were then used to break the power of the Apaches, and also to hold less powerful tribes to Spanish allegiance for protection from the Comanches. Although small hostilities continued from time to time, no general outbreak of the indios bárbaros ever occurred, and the sporadic depredations could now be countered effectively by the forces of Spain and her Indian allies.

This study explores the ethical and legal bases of Spanish Indian policies; the importance of personal diplomacy in dealing with Indian populations; and the effect upon the Spanish frontier and its Indian populations of the expanding French, English and American frontiers. The latter are considered in the light of the international rivalries of the eighteenth century. Also considered is the ethno-historical importance of the impacts of European livestock and technology on the indios bárbaros, and the ferment of Indian population movements which were set in motion by the diffusion of these elements and by the encroachments of European immigrants. The whole is considered in its vital aspect as background to the history of the relationships of the United States with these same tribes on its western frontier in the nineteenth century.

196 pages. \$2.55. Mic 57-2792

JAMES LARKIN AND THE IRISH LABOUR MOVEMENT, 1876 - 1914

(Publication No. 22,053)

Emmet J. Larkin, Ph.D.
Columbia University, 1957

James Larkin was born in Liverpool "about" January 21, 1876, and died in Dublin on January 31, 1947. His life may be conveniently divided into four periods: Great Britain, 1876-1907; Ireland, 1907-1914; the United States, 1914-1923; Ireland, 1923-1947. This essay only concerns his life up until 1914. The poverty and social injustice he experienced as a boy in Liverpool slums resulted in Larkin turning to Socialism while still in his teens. He was one of the charter members of the Independent Labour Party, founded in 1893. After a year at sea (1894-1895), Larkin

returned to the Liverpool dockside, where he eventually worked his way up to the position of a foreman dock porter with the Harrison Line. He joined the National Union of Dock Labourers in 1901, and became in time a convinced trade unionist as well as a convinced Socialist. When, in 1905, a dispute broke out in the Harrison sheds, Larkin sided with the men. The strike was lost, but Larkin was compensated by being appointed an organizer for the N.U.D.L.

In 1906 he reorganized the Scottish ports, and in 1907 he began the reorganization of the moribund Irish ports for the N.U.D.L. By the end of 1907 Larkin had conducted in Belfast the greatest strike that had ever been experienced in Ireland, and swept some 5,000 men into the Belfast branch of the N.U.D.L. He then moved to Dublin, where by the end of 1908 he had gathered some 3,000 members into the Dublin branch after several sharp encounters with the Dublin employers. Differences between the Executive of the N.U.D.L. and Larkin resulted in his breaking with the parent body and establishing the Irish Transport and General Workers' Union in Dublin in early 1909. The severe trade depression which had begun at the end of 1907, the decline in real wages, and a disastrous unemployment situation forced Larkin to limit his operations.

By the summer of 1911 conditions had improved. The worst of the trade depression and the unemployment problem had passed, and the working classes the world over became imbued with a new militant spirit. There evolved a revolutionary trades unionism, popularly called syndicalism. In Ireland, Larkin fashioned the new views to the existing conditions. He made the Transport Union the largest and most militant union in Ireland. Its main strength was in Dublin, though branches had been organized throughout Ireland. By the summer of 1913, Larkin literally held the port of Dublin in the palm of his hand. When he tried to organize the men in the Dublin United Tramway Company, in August, 1913, William Martin Murphy, chairman of the Tramway Company and leading spirit in the Dublin Employers Federation, decided to crush "Larkinism" once and for all.

In early September, 1913, some 404 Dublin employers, led by Murphy, presented their employees with an ultimatum. The employers demanded that their employees, if members of the Transport Union, quit their membership, and if not members, promise never to join the Transport Union. By the middle of September some 25,000 Dublin workers were locked out for refusing to sign the "document." Larkin appealed to the British trade union movement for support, and the result was contributions amounting to nearly £150,000. The dispute lasted some five months, but by February, 1914, the men began to drift back to work. The lockout was lost largely because Larkin alienated the leaders of the British trade union movement by bitter personal attacks. He felt they should have struck in sympathy with the Dublin workers to bring the Dublin employers to terms. Larkin left for America in October, 1914, to try to raise money, and did not return to Ireland for nine years.

464 pages. \$5.90. Mic 57-2793

THE BOSTON MANUFACTURING COMPANY OF
WALTHAM, MASSACHUSETTS, 1813-1848:
THE FIRST MODERN FACTORY IN AMERICA

(Publication No. 21,740)

Kenneth Frank Mailloux, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor W. S. Tryon

The Boston Manufacturing Company was established on the Charles River in Waltham, Massachusetts, in 1813. It was America's first modern factory not, as has often been stated, because it first put the processes of carding, spinning and weaving cotton under one roof, but because it first put these processes to work by power.

The company had twelve original proprietors; the three most important were Francis Cabot Lowell, Nathan Appleton, and Patrick Tracy Jackson, all Boston merchants who had made fortunes in commerce and who sought new fields for investment when the War of 1812 made shipping unprofitable. Lowell was especially influential, for in 1811 he visited English factories and memorized plans for a power loom—export of textile machinery and emigration of mechanics was strictly prohibited by British law.

To superintend its machine shop, the new company fortunately found Paul Moody. His mechanical genius gave the industry many improvements and several inventions. His shop became a "school for mechanics" and, although the company tried to prevent it, many of the workers stayed only long enough to learn, before answering the huge demand for Waltham-trained men in other factories.

At that time, there was prejudice against diverting labor from agriculture, and the company's solution to that problem was so revolutionary as to attract international interest. It employed girls from the surrounding countryside, assuming moral and physical guardianship. This was the first attempt at a system which later became famous at Lowell. The girls worked an 80 hour week, but pay (about \$2.00 a week after board and room) was good compared to that in most jobs open to women.

The company prospered. Its large liquid capital enabled it to meet financial crisis; its power machinery was efficient; its product, cheap coarse sheetings and shirtings, were much in demand. Moreover, the minimum clause of the Tariff of 1816 broke foreign competition. The Waltham company's supremacy in the field allowed it to weather the depression of 1818-1819, during which many other textile manufacturers failed.

Success led to imitators and desire for Waltham-type machinery. The company inaugurated two new policies: that of building and selling machinery, and that of selling the right to copy. With the first policy, the company became a manufacturer of machinery, as well as of cloth.

The company's influence on Waltham was tremendous. It gave the town its first fire department, second church, schools, roads, and many other physical improvements. It also sponsored several semi-public cultural organizations, such as the employee library and the Rumford Institute. In general, it changed the town from an agricultural to a manufacturing community.

The mills grew until the Charles could no longer supply sufficient water power. Thereupon, Jackson and Appleton joined with Paul Moody and the Boott brothers, and purchased the Pawtucket Canal Company. This gave them the

whole power of the Merrimack, and at a good site in Chelmsford they established the Merrimack Manufacturing Company, the first textile corporation in an area which was to be called Lowell, after the late Francis C. Lowell. The Boston Manufacturing Company supplied machinery and key workers for the new mill, and as its potential became apparent, transferred almost the whole machine shop from Waltham to Chelmsford. The first Lowell mills were, then, an outgrowth of the Boston Manufacturing Company.

The Boston Manufacturing Company was of enormous significance during the first thirty-five years of its operation. It developed a system that not only built a successful business, but served as a laboratory and nursery for the American textile industry. 239 pages. \$3.10. Mic 57-2794

THE DIPLOMATIC CAREER OF HENRY LANE WILSON IN LATIN AMERICA

(Publication No. 21,992)

Eugene Frank Masingill, Ph.D.
Louisiana State University, 1957

Supervisor: Dr. John Preston Moore

The aim of this dissertation is to show that the much-criticized diplomacy of Henry Lane Wilson in Mexico was, in reality, largely approved until President Woodrow Wilson reversed the traditional recognition policy of the United States by refusing to accept Victoriano Huerta as the constitutional president of Mexico. It was then that (H. L.) Wilson fell a victim to political circumstances.

Through his brother's influence, (H. L.) Wilson was appointed Minister to Chile in 1897. He labored to increase political and commercial intercourse between the United States and Chile; and when his service in Chile ended in 1905, there had been a noticeable improvement in this respect, attributed, in large part, to the attitude and energy of the American Minister.

Recognition of Wilson's hard work at such an insignificant post led President Theodore Roosevelt to transfer him to Belgium, a more comfortable post. Contact with royalty and association with European diplomats helped to broaden his experience.

Wilson was appointed Ambassador to Mexico by President Taft and he took up his duties at that post in 1910, the true representative of a "dollar diplomacy" administration. The immense volume of American business investment in Mexico gave Wilson more importance than he had ever enjoyed; he fancied himself a special guardian of private enterprises in which citizens of the United States were interested, and was naturally disturbed when the dictatorship regime of Porfirio Diaz began to crumble before the onslaught of a revolution headed by Francisco I. Madero.

As Madero swept into power in 1911, Wilson became ever more apprehensive of the future; especially so when Madero refused to court the favor of the American Ambassador. Madero's sensitiveness to Mexican needs was interpreted by Wilson as anti-Americanism, while Wilson's impatience with the unstable condition of Mexico caused Madero to regard the American Ambassador as a dangerous enemy.

Taft and Secretary of State Knox were cognizant, at all

times, of conditions in Mexico and policy was formulated with an eye to stabilizing conditions in that country. This policy included the probability of armed intervention in the not too distant future.

In February, 1913, Madero was suddenly faced with a second uprising under Félix Díaz. Victoriano Huerta, the commander-in-chief of the army, deposed Madero during the ensuing siege of Mexico City and then signed a pact with Díaz by which Huerta became Provisional President. These circumstances were actively encouraged by Henry Lane Wilson as measures to end the fighting in the city. Wilson had the support of the most influential members of the Diplomatic Corps. The pact between Huerta and Díaz was signed in the American Embassy.

Two days after his resignation, Madero was assassinated under mysterious circumstances, an act which hindered Ambassador Wilson's plan to secure the recognition of Huerta by the United States. Woodrow Wilson, who became President of the United States in March, ignored his Ambassador to Mexico and refused to recognize Huerta. (W.) Wilson's demand that Huerta step down drew the United States into a unique position as recognition had been traditionally extended on a *de facto* basis after international commitments were satisfied.

Although (H. L.) Wilson was not allowed to resign, agents were sent to Mexico to investigate conditions. On the basis of their reports, which were unfavorable to the Ambassador, he was suddenly recalled in July, 1913, and dismissed from the service after sixteen years as a career diplomat. 266 pages. \$3.45. Mic 57-2795

PUERTO RICAN POLITICS AND THE NEW DEAL

(Publication No. 22,056)

Thomas G. Mathews, Ph.D.
Columbia University, 1957

The New Deal set out to reverse the thirty years of colonial neglect which had produced a chronic state of poverty in Puerto Rico. However, the first Roosevelt appointee in Puerto Rico, Robert Gore, was an inept and inexperienced administrator. Governor Gore was soon caught up in the political struggles of the Puerto Ricans. The final battle revolved around a move to interject politics into the educational system under the guise of setting up an Americanization program. The case was carried to the President. Roosevelt acting on the studied advice of Dr. Hopkins, President of Dartmouth College, backed the incumbent Commissioner of Education. Robert Gore resigned and was replaced by the austere and prestige-bearing military figure of General Blanton Winship.

The plans for economic reconstruction of Puerto Rico were launched during a visit to the island by Mrs. Roosevelt and Dr. Tugwell. Three prominent Puerto Ricans were selected to draw up an economic plan which had as its central feature the enforcing of the 500-acre limitation in the corporate ownership of sugar land. Dr. Ernest Gruening, a recognized liberal and friend of the Puerto Rican politician who had led the fight against Gore, Luis Muñoz Marín, was appointed administrator of the Puerto Rican Reconstruction Administration.

Due to the administrative and legal difficulties the

program was slow in developing. Limited funds forced a revision of the over-all objectives of the program. Model sugar, coffee, and tobacco farms were set up. However, the administration of this program was tightly controlled by Dr. Gruening. The Puerto Ricans who worked closely with him were, for the most part, the political followers of Luis Muñoz Marín, who was also a leader in the movement for independence of the island.

Violence by the more extreme independentistas provoked a decision by the federal government to offer independence to the islanders. This move was designed to lay to rest all independence agitation either by having it accepted, a result which was not thought probable, or by having it rejected. Senator Muñoz Marín, who, with other Puerto Ricans, had not been consulted on this move, argued that the issue of independence was not being fairly offered to the Puerto Rican people since the economic conditions under which independence would be granted were detrimental to the islanders.

Dr. Gruening was most concerned that independence be rejected. In an effort to prevent his Puerto Rican Reconstruction Administration from being used by the pro-independence elements he undertook to drive out or silence all known independentistas in his organization. He also made inquiries concerning the loyalty of the educational system. He cooperated with General Winship in moves to restrict the demonstration of the more extreme leaders of the pro-independence movement.

In the opinion of the Washington officials the results of the 1936 election on the island rejected the offer of independence. Discrimination against those who expressed independence sentiments now increased more than ever. The pro-independence wing of the minority party was broken thus destroying the effective political opposition. The once defended Commissioner of Education was replaced by an unknown figure who was instructed to convert Puerto Ricans into Americans. Finally the slow pressure of government restrictions on the extremists broke out into tragic violence which saw almost twenty peaceful demonstrators killed by the police.

The study ends at this low point in United States-Puerto Rican relations. The New Deal which had gotten off on a false start wound up in an even more reactionary state. The brief interim marked by attempts at economic renovation pointed toward a possible answer to thirty years of colonialism.

497 pages. \$6.35. Mic 27-2796

THE U. S. ARMY'S CURRENCY MANAGEMENT IN WORLD WAR II

(Publication No. 21,839)

Walter Rundell, Jr., Ph.D.
The American University, 1957

"The U. S. Army's Currency Management in World War II" deals with the various currency problems the Army faced in the second World War: invasion currencies, funding, exchange of currencies, and currency control. In this order, the problems of currency management developed. The Army adopted invasion currencies for combat operations. Then disbursing officers were funded (supplied) with the currency they needed. After soldiers received

foreign currencies in pay, they often wanted some of their pay exchanged into dollar credits, such as postal money orders or war bonds. Also, when soldiers began crossing national borders in Europe, they needed one national currency exchanged for another. The most sensitive part of currency management was currency control. It lay at the end of the process of using invasion currencies, funding, and exchanging currencies. If these functions were handled properly, currency control would be achieved. If not, currency control would be a failure. After the war got under way, these components of currency management interacted simultaneously. But the unique problems of each function can best be studied topically.

This dissertation devotes a chapter to each of the first three phases of currency management and two chapters to currency control. Whereas the problems connected with invasion currencies, funding, and exchanges were primarily of a wartime nature, serious currency control difficulties developed only during the first year of the occupation. Since the occupation difficulties so clearly had their seeds in wartime policy, it would be a misrepresentation to pretend that the story concluded on V-J Day. Consequently, the dissertation treats the wartime and occupation problems of currency control in separate chapters, showing the causal relationship between the two. When the problems of currency management differed noticeably from one overseas locale to another, the dissertation treats these problems individually. For instance, the chapter on funding devotes separate sections to funding problems in the Pacific and on the European Continent. Within such organizational divisions, the problems are examined chronologically to show their development.

After the exposition on the development of the problems connected with each integral part of currency management, the dissertation makes an evaluation of the Army's currency management as a whole. This evaluation, while always presupposing the subordination of currency management to the paramount tactical considerations, considers two points. One is how well the Army handled mechanical aspects of the problem--getting funds into the hands of disbursing officers and exchanging pay for the troops. The other is the success of the program in terms of currency control. Generally, the Army handled the mechanical aspects of currency management satisfactorily. Certain weaknesses in the funding and exchange functions cannot obscure the facts that for the most part disbursing officers got the currency they needed to fulfill the Army's fiscal obligations and that most soldiers got their pay exchanged properly. Where the exchange process broke down was when currencies not derived from pay were exchanged or converted into dollar credits. From the standpoint of currency control, the Army's World War II program of currency management was a failure. Had the Army ever made a concerted, thoughtful effort to achieve currency control, the failure might have appeared less grave. But in view of the facts that the Army's actions betrayed a fundamental lack of understanding of the problem, that its efforts at achievement were misconceived, and that the final solution to the problem came from outside the Army, this phase of currency management was a thoroughgoing failure.

280 pages. \$3.60. Mic 57-2797

**THE DEMOCRACY MOVEMENT IN JAPAN:
1916-1921; A HISTORY OF A SOCIAL MOVEMENT**

(Publication No. 21,947)

Bernard S. Silberman, Ph.D.
University of Michigan, 1956

The main purpose of this study is to trace and to explain the origins, growth, and decline of the Democracy Movement, a socio-political movement which occurred in Japan between the years 1916-1921. An equally important aim of this study is to attempt to ascertain the significance and role of this movement in modern Japanese history.

Because the Democracy Movement represented an important phase in the social, political, and economic changes which occurred in Japan during this period, its implications are rather broad. It is related to such various phenomena as the development of Japanese industry, an industrial population, the development of political parties, and the impact of Western influences on Japanese society. For this reason, the scope of this study extends beyond the limits of the Democracy Movement proper. Consequently, excursions have been made into matters which, strictly speaking, belong in the areas of economic and political history and political theory.

Thus, although the movement itself did not begin until 1916, this study takes as its starting point the beginning of the Meiji Period (1868-1912). In Chapter I the social and political effects of Japan's adoption of Western technology and techniques are examined. For instance, in this chapter, the development of Japanese industry and the rise of an industrial population which formed an important element in the Democracy Movement are traced.

This review paves the way for the discussion and analysis in Chapter II, of the social and political changes of 1912-1916 which motivated a small group of intellectuals led by Yoshino Sakuzō to attack the contemporary political institutions and leadership. Chapter III is an analysis of the philosophical basis of the Democracy Movement which these men used to attack the existing world-view. Here the organ theory of Minobe Tatsukichi is discussed as the basis for the adoption by Yoshino Sakuzō and Ōyama Ikuo of English liberalism of the late nineteenth and early twentieth centuries. Then the effects of World War I on Japanese society are discussed in some detail in order to examine the causes for the demand, on the part of the industrial working class and the intellectuals, for political reform. Following this chapter is a description of the rise of the Democracy Movement in 1918-1919 which traces the activities of the various intellectual groups in their attempt to raise mass support, especially among labor, for a program of universal manhood suffrage and truly representative government. Chapter VI describes the effects of government repression and refusal of these demands on the Democracy Movement. The rejection of liberalism and the adoption of socialism by the movement is analyzed from this viewpoint. The study is rounded out by a chapter which discusses the important role of the Democracy Movement in the Japanese social mass movements of the twenties and thirties. The final chapter is one of analysis and conclusions concerning the nature and significance of the Democracy Movement in modern Japanese history.

Three specific conclusions concerning the significance of this movement can be drawn from this study. 1) The Democracy Movement was primarily responsible for

arousing mass support and pressure for universal manhood suffrage which eventually forced the passage of such a bill in 1925. 2) The movement achieved the union of the intellectuals with the industrial working class, thus providing a pattern of leadership for the social mass parties in Japanese political life. 3) The Democracy Movement, as the first attempt at a mass movement, provided a training ground for the future leadership of social mass parties in pre World War II Japan.

One overall conclusion which can be drawn from this study is that liberalism failed to become the basis of a mass movement because it was adopted into historical and social environment entirely different from those conditions which originally had given rise to such an ideology.

264 pages. \$3.40. Mic 57-2798

REXFORD GUY TUGWELL AND THE NEW DEAL

(Publication No. 21,747)

Bernard Sternsher, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Ernest M. Law

Rexford Guy Tugwell, Professor of Economics at Columbia, joined the Roosevelt circle in March, 1932. He was Assistant Secretary of Agriculture, 1933-34, Under Secretary, 1934-36, and Resettlement Administrator, 1935-36. He helped to write the National Industrial Recovery Act and the Agricultural Adjustment Act. He was an idea man; a publicist; and an errand boy, bringing academicians, or their ideas, to Roosevelt. He was a member of several interdepartmental boards.

Overestimations of Tugwell's influence rested on the assumption that his intellectual impact on Roosevelt was decisive. Roosevelt used or disregarded Tugwell's ideas as he saw fit. Some policies were in accord with Tugwell's thinking; it is impossible to measure the professor's impact on such matters. Roosevelt took no action on some of Tugwell's ideas, especially those involved in the institutional economist's concept of "conjuncture." In one exceptional case, the field of fiscal policy, money, and banking, initial rejection of Tugwell's ideas was followed, to some extent, by their implementation--in the "Second" New Deal. Tugwell's impact in this instance was indirect--he was largely responsible for Marriner S. Eccles' coming to Washington.

Tugwell administered the old-line bureaus of Agriculture, reorganizing them and attempting to increase the powers of one of them--the Food and Drug Administration--a new agency in Agriculture--the Soil Conservation Service--and a new independent agency--the Resettlement Administration. His sponsorship, at Presidential direction, of a food and drugs bill largely accounted for his becoming the Administration's whipping boy. His attackers conducted a concerted, ruthless, and successful campaign to defeat the bill by discrediting him with the public. They distorted his ideas, academic and administrative. They impugned his motives, administrative ability, and loyalty.

Tugwell defeated George Peek, Agricultural Adjustment Administrator, in 1933 on the question of emphasizing production controls rather than marketing agreements and

subsidization of exports. By 1935 he lost hope that the AAA would implement his broad view of the farm problem, which stressed the relationship of agriculture to the rest of the economy.

Tugwell was interested in the distribution of income among farmers themselves, deploring the "capture" of the AAA by big staple farmers. Through the Resettlement Administration, which he practically invented himself, he provided short-run assistance to small farmers. He also conducted what amounted to a demonstration of long-run possibilities in the conservation approach to the agricultural problem.

Tugwell judged that Roosevelt's policies "saved the domestic situation." They did not get at the roots of our economic difficulties. The New Deal, despite the AAA and the NRA, which was "perverted" by its business-minded administrators, was essentially "Progressive"--an attempt to "make capitalists behave." Administratively, Roosevelt definitely abandoned "conjuncture" in 1935. Intellectually, the New Deal remained torn between trust-busting and "concentration and control."

In 1938 Roosevelt finally saw that social management rather than reform was necessary. The President's recognition of new policy requirements, because of the need for an anti-Axis policy and the domestic compromises which that need dictated, was too late.

Tugwell resigned in late 1936 primarily because, as an institutional economist, he was not at home in the New Deal. To serve in the emergency he had "sunk personal preferences." He did not think that Roosevelt's policies were the best policies, but he considered Roosevelt the best man available to lead the fight against depression. He believed that Roosevelt did his best, sometimes using devious means, to attain his end of improving the lot of common men. Tugwell's service, partially motivated by personal loyalty, was largely intellectual in its origin. His background indicated that he was not an emotional do-gooder. Nevertheless, his contribution was, in its impact, humanitarian.

1214 pages. \$15.30. Mic 57-2799

GERMANIA ILLUSTRATA: TOPOGRAPHICAL-HISTORICAL DESCRIPTIONS OF GERMANY IN THE SIXTEENTH CENTURY

(Publication No. 21,130)

Gerald Strauss, Ph.D.
Columbia University, 1957

Throughout the sixteenth century, humanist scholars in Germany produced a large body of topographical and historical descriptions. Their purpose was to display the heritage and contemporary appearance of the German lands and their inhabitants, that is, to illustrate Germany.

The rise of this topographical-historical genre was a symptom of the intellectual climate of the age and of the major concerns of German humanism. The expanding physical world and the political and social crises turned eyes and minds to the current scene. The temptation to describe this scene was stimulated by reports from the New World and of continental travel. For Germany this advent of a descriptive literature came at a particularly opportune time. Interest in German antiquity was keen,

awakened by the view of tribal life found in Tacitus' recently discovered *Germania* and rooted in the general humanist orientation toward the classical age. Open competition with Italy for the laurels which the humanist age could bestow brought many German writers to this genre which would spread out the attractions of their country, and a strong didactic urge attracted them to it as a vehicle for their moral preachments.

In the first half of the century the topographical-historical genre was defined, chiefly by the Swiss humanist Joachim Vadian, and worked out in practice by Sebastian Münster, Johann Stumpf, and others. From Ptolemy's *Geography* came its names, chorography and cosmography; but Ptolemy's definitions were too narrow to suit the purpose of the German humanists. To render a total picture of Germany, the germane disciplines of descriptive geography and narrative history were combined in a manner suggested by Strabo, whose *Geography* impressed the age with its comprehensiveness so akin to humanist universality, and more recently found in the writings of Enea Silvio de' Piccolomini.

The magnitude of this undertaking to describe Germany was soon realized, and the project became a collective one. An initial collaborative impetus had come as early as 1492 from Konrad Celtis, who exhorted a host of disciples and colleagues to embark on a common program of historical and geographical research in order to make their country known. Throughout the century, German humanists furnished each other with contributions toward the realization of the scheme. The great *Cosmographies* of Sebastian Franck, Sebastian Münster, and Johann Rauw, the only volumes to attempt comprehensive surveys of all of Germany, were constructed of material obtained from many sources in all quarters of Germany. More characteristic of the genre were the many local and territorial descriptions whose narrower compass permitted a painstakingly exact and detailed topographical survey of a region. Every territory of Germany found its chorographers, and at the end of the century it was rightly claimed that Germany had been accurately and instructively portrayed.

Among the writers of chorographic descriptions we find many names familiar to a student of sixteenth-century German history: Joachim Vadian, Sebastian Brant, Johann Aventinus, Sebastian Münster, Johann Cuspinian. But a far greater number is no longer remembered, Peter Albinus, Guler von Weineck, Michael Neander, Matthias Quad, Johann Rauw, Thomas Kantzow, to name only a few. Their books may still be read with profit and enjoyment for the myriad bits of information they convey about Germany in early modern times. Beyond this, the attainment of their immediate purpose, these volumes speak their authors' views on a great variety of topics. Because of their sheer bulk, their vigor of style and attractiveness of appearance, and because of the forceful personalities that reveal themselves in them, these writings should take their place in any general estimate of German humanism.

485 pages. \$6.20. Mic 57-2800

**FRANCISCO ZARCO, THE LIBERAL
SPOKESMAN OF LA REFORMA**

(Publication No. 21,040)

Raymond Curtis Wheat, Ph.D.
The University of Texas, 1957

Supervisor: Dr. Carlos E. Castañeda

Independence attained, Mexico continued to live in its past. Not until the Reforma did it break with the economy and the philosophy of colonial days. In bringing about the transition that changed its outlook, no man contributed more than Francisco Zarco. As the outspoken journalist of the liberals, he helped popularize the ideology of liberalism.

Born in Durango in 1829, he was taken to Mexico City in his infancy, where his alert mind and phenomenal memory attracted the attention of prominent political leaders and men of letters. By the time he was 18, he had attained recognition and had become a journalist, a determined adherent of liberalism. In spite of his youth, he became a fearless defender of the new philosophy and incurred the enmity of the conservatives.

In the life and death struggle between conservatives and liberals, Zarco followed the Patriarchs of the Mexican Reform movement, José María Luis Mora and Valentín Gómez Farías. The failure of the Mexican War and the chaotic conditions that followed the defeat and the loss of national territory convinced Zarco that Mexico's salvation lay in acquainting the people with the principles of liberalism. As editor of *El Siglo Diez y Nueve*, the leading liberal newspaper of Mexico, he led the movement for political and social reform in his country from 1849 until the year of his death in 1869. His powerful editorials aroused the people to shake off the backward customs of the colonial past and helped to liberate them from the domination of the Army, the Church, and the vested interests of the large land owners. They contributed to many social as well as political reforms. He was one of the first to advocate child labor laws, the education of women, prison reform, and the revolutionary idea that punishment should fit the crime.

When the Constituent Convention of 1856-1857 met, Zarco was a delegate, defending the liberal reforms he had advocated in the press. He gained stature on the floor by his brilliant defense of individual rights and the need for the complete separation of Church and State. He, unlike other liberals, believed in fairness to all concerned, and was not afraid to speak against encroachments on individual rights by either liberals or conservatives. While serving in the congress, he carried to the people a faithful account of the daily proceedings through his writings in *El Siglo Diez y Nueve*, whose editorials were frequently reproduced in the liberal press throughout the country. His *Historia del Congreso* is the only complete and accurate record of the proceedings of the memorable congress that framed the Constitution of 1857. He has recorded the arguments of conservatives and liberals alike and has given to posterity an opportunity to relive the feverish days of La Reforma as the leaders of the great struggle for reform lived them.

The adoption and implementation of the new constitution led to Mexico's bitterest civil war, the Guerra de Reforma (1858-1860), during which Zarco continued to defend the

liberal reforms and the new national charter, unwaveringly supporting Juárez and his government throughout the struggle. When, in despair, the conservatives called in foreign intervention, and Maximilian was brought to Mexico under the auspices of French arms, Zarco denounced the interventionists with the same fearlessness he had opposed the reaction. He accompanied the errant Juárez government from Mexico City to Saltillo, suffered exile, and defended the liberal government abroad in his efforts to obtain sympathy and support for the cause of legality.

After the intervention, he returned and was hailed by the liberals as the great defender of their cause. But privations, suffering, and overwork exacted their toll. Weakened and sick, he survived the triumph of liberalism only two years. 460 pages. \$5.85. Mic 57-2801

**BENJAMIN FRANKLIN: A STUDY OF PENNSYLVANIA
POLITICS AND THE COLONIAL AGENCY, 1755-1775**

(Publication No. 21,949)

John Joseph Zimmerman, Ph.D.
University of Michigan, 1956

The purpose of this study is threefold: (1) to present a narrative of the controversies which led the Pennsylvania assembly to select Franklin to represent the province in England from 1757 to 1762, and again from 1764 to 1775; (2) to describe Franklin's activities in carrying out the assembly's resolves; and (3) to show the political influence which Franklin exerted upon Pennsylvania politics as a member of the House and as a colonial agent in the twenty years prior to the American Revolution. Studies of Pennsylvania colonial history have paid little attention either to Franklin's role as an agent or to the agency. Mabel P. Wolff's earlier study of the agency ended with the year 1757, and it is hoped that this work will help to close the lacuna in that important period of Pennsylvania's colonial history.

Each of the two missions stemmed from an unsuccessful attempt of the assembly and the governor to agree to legislation that would provide funds for military requirements. In each instance, the crux of the dispute was constitutional: the central issue was the status of the proprietary instructions. Specifically, the disputes over taxation, paper money issues, and the nomination of commissioners provided for in the various bills all involved the Penns' instructions: instructions which the House refused to accept as legally binding.

When Franklin, in 1757, upon the advice of English friends, decided to negotiate with the Penns rather than petition the crown, he technically violated his orders. After protracted meetings between Franklin and Thomas Penn, a compromise settlement of the taxation problem was reached in 1760, but other issues were not settled. The mission was, then, only partly successful, but the assembly considered the compromise a victory in principle; the Penns would pay property taxes.

The first mission is also noteworthy in that as early as 1758 Franklin began an attack on the Penn government; he simultaneously solicited support in the province for a petition to the crown for royal government. He also changed the nature of the agency by remaining in England

after the provincial affairs had been settled to write and to speak as an agent for all of the North American colonies in their common interests.

When disputes broke out between the assembly and Governor Penn in 1764, the House on resolving to petition for royal government selected Franklin to assist in its presentation. The ostensible reason for the second mission was to secure a favorable hearing on the petition, but the project soon became submerged by the greater crisis between the colonies and the mother country. By 1768 Franklin had lost interest in the petition. After the peculiar problems of Pennsylvania ceased to play the dominant role

in the agency, Franklin remained in England as the foremost colonial spokesman for American rights within the empire.

The main *raison d'être* of the mission, the change to royal government, was not accomplished; the mission, therefore, may be considered a failure. Yet the assembly recognizing Franklin's value to all the colonies yearly reappointed him agent. Franklin's influence with leading Philadelphia merchants and politicians, especially with Charles Thomson, did much to support the patriot party in Pennsylvania and to insure success in the ultimate movement for independence. 347 pages. \$4.45. Mic 57-2802

LANGUAGE AND LITERATURE

LANGUAGE AND LITERATURE, GENERAL

TUDOR BIBLICAL DRAMA

(Publication No. 22,034)

Ruth Harriett Blackburn, Ph.D.
Columbia University, 1957

Medieval mystery plays survived in England throughout the Tudor period, although they underwent some theological modification and suffered a decline after c.1570. The medieval morality, a more flexible form, was adapted to a variety of purposes during the century, the first experiment being an attack on Wolsey in *Godly Queen Hester*. Side by side with these traditional forms, a new body of Biblical drama came into existence, chiefly inspired by the religious upheavals of the time and moulded largely by the Protestant viewpoint. Twenty-five new scriptural plays from 1520-1603 were extant, and these are the subject of the study. These plays were influenced by the native dramatic tradition, by classical and continental example, and by theological controversy. Luther, Melancthon, and Calvin all voiced their approval of Biblical drama and in the early days of the Reformation it was a valuable propaganda weapon.

John Bale, a converted Carmelite and protégé of Thomas Cromwell, displays in his work a mingling of medieval form and passionately felt Protestant conviction. His *Three Laws*, which surveys the history of man since Adam, embodies Luther's view that the Reformation party is about to triumph over the forces of Antichrist, which include hypocrites of all ages and the Roman hierarchy, all in league with Satan. Of Bale's cycle on the life of Christ, only *God's Promises*, *John Baptist's Preaching*, and a *Temptation* survive. The first is a Protestant version of a prophet play and the second pictures John as a prototype of Bale's martyred friends and colleagues. All three plays emphasize the abuses in the Catholic Church, the desirability of faith and Bible study, and the hope of imminent triumph.

In the forties, Cambridge and Oxford scholars wrote a handful of Greek and Latin plays inspired by classical models and by continental neo-Latin drama of which George Buchanan's *Baptistes* and *Jephthes* were the most famous

example. Nicholas Grimald's *Christus Redivivus*, though it resembles a medieval passion play, is Protestant in viewpoint, as is his *Archipropheta*, a study of the Baptist story remarkable for its romantic treatment of the Herod-Herodias relationship. As in Bale's play, John himself is given contemporary significance because of his resemblance to prophet-martyrs of the early Reformation. The Protestant *Weltanschauung* is expressed in its extreme form in John Foxe's *Christus Triumphans*, a violent Antichrist play based partly on the book of Revelation and partly on the history of the church since the crucifixion. John Christopherson's *Jephthe* (in Greek) and an anonymous *Absalon* are imitations respectively of *Iphigenia in Aulis* and of Senecan tragedies. All these authors wished to rival the ancients and most of them assumed that their works would be superior because their subject matter, being drawn from the Bible, was in a unique sense true and holy.

The first decade of Elizabeth saw a resurgence of Biblical drama. The native popular plays, *King Darius*, *The Cruel Debtor*, *Susanna*, and *Mary Magdalene*, are unpretentious and heavily didactic. All combine a morality underplot with the Bible story and lean heavily on morality characters and plot devices. Of the three academic plays, Beza's *Abraham's Sacrifice* and Birck's *Sapientia Solomonis* were both imported from the continent. The native *Jacob* and *Esau* owes its excellent construction of the intrigue and most of its amusing characters and scenes to Roman models, while maintaining a rigidly Calvinist interpretation of the doctrine of election. After about 1570, both popular and academic Biblical drama declined, at the same period as the municipal cycles, probably as a result of growing Puritan prejudice against the theater.

There was another revival of Biblical drama among Shakespeare's contemporaries. Henslowe commissioned about a dozen Biblical plays, all of which are lost. Greene and Lodge wrote *A Looking Glass for London and England*, a retelling of the *Jonah* story in which Nineveh is intended as a warning to London and England. Peele's *David and Bethsabe* is a study of the passions of love and ambition and glorifies David and Solomon somewhat in the manner of a miracle play. Two other works, *Queen Esther* and *Proud Haman* and *The Prodigal Son*, both effectively done were in the repertoire of the English Comedians

in Germany and are known only through German translations. 377 pages. \$4.85. Mic 57-2803

GEORGE HERBERT: A REVALUATION

(Publication No. 22,035)

George Wilson Boyd, Ph.D.
Columbia University, 1957

The revaluation which the dissertation proposes is based on the contention that a profitable modern reading of Herbert is possible only when he is read in the tradition of the religious lyric, not in the tradition of the metaphysical "school of Donne." Chapter I is historical and critical background for such a reading. Herbert's reputation is traced in detail. He was regarded in the seventeenth century as a divine poet; in the eighteenth century he was censured as a "false" wit; in the nineteenth century he was admired for his lyricism, but the admiration was tempered by distaste for his "quaint" conceits, a reservation which seems to have led to the mid-nineteenth-century application of the metaphysical label. In the twentieth century Herbert's classification as metaphysical has been continued in most criticism following Professor Grierson's edition of *Metaphysical Lyrics and Poems* (1921). Although some excellent Herbert criticism of the past decade has explored more satisfying approaches to his work than the metaphysical one, none of it has specifically or systematically examined Herbert's poetry to show its essential differences from metaphysical poetry. The second part of Chapter I traces the evolving meaning of metaphysical from Dryden to the present.

Chapters II, III, IV, and V examine Herbert's poetry in the fundamental creative areas of poetic intention, tone, language, and structure to show that Herbert's practices are characteristically those of a religious lyricist, not those of the school of Donne. Chapter II analyzes Herbert's single purpose of praise; Chapter III characterizes his impersonal poetic voice; Chapter IV studies his language in its purity of sources and clarity of execution; Chapter V suggests that the shaping force of Herbert's structure is not intellectual argument but lyric emotion.

Upon the basis of the contention that Herbert can best be read as a religious lyricist, not as a Donnean metaphysical, Chapter VI offers an interpretation of the purpose and structure of *The Temple* derived from the organic ideas of order and praise which Herbert drew from Christian tradition and worship. The ideas are fused in the temple symbol and are expressed in a five-fold progression which reproduces the essential experience of a Christian in God's temple. The movements are preparation, entry, conflict and resolution, individual triumph, and triumph for Christ's Body, the Church. Herbert's symbolic and cyclical structure for *The Temple*, informing the thematic development of each poem in the book, was drawn from his fundamental poetic concern as a Christian lyricist.

221 pages. \$2.90. Mic 57-2804

COMSTOCKERY: A STUDY IN THE RISE AND DECLINE OF A WATCHDOG CENSORSHIP; WITH ATTENTION PARTICULARLY TO THE REPORTS OF THE NEW YORK SOCIETY FOR THE SUPPRESSION OF VICE, TO MAGAZINE ARTICLES AND TO NEWS ITEMS AND EDITORIALS IN THE NEW YORK TIMES, SUPPLEMENTING OTHER STANDARD STUDIES ON COMSTOCK AND CENSORSHIP

(Publication No. 21,779)

William Lee Curry, Ph.D.
Columbia University, 1957

Chairman: Lennox Grey

The testimony of more than 200 magazine articles from 1878 to 1950, the Annual Reports of the New York Society for the Suppression of Vice from 1875 to 1948, the 40 news items and editorials of the *New York Times* from 1876 to 1915, and the dozen key books on Comstock and censorship, support no single simple explanation of the paradox in our American insistence on freedom of speech, on the one hand, and our occasional acceptance of a watchdog censorship, on the other.

Since various people hold various opinions and act from various motives, there are good reasons to believe that all the tentative hypotheses set forth at the start of this study are true in some measure, and that the support and acceptance of Comstockery combined at least the following:

- (1) Persistent Puritan, paternalistic patterns in our society.
- (2) Strong but passing Victorian prudery, insisting on the proprieties, decorum, secrecy and silence in matters of sex.
- (3) A fear of changing times, and a desire on the part of many people, especially the successful, to maintain the status quo.
- (4) Fear and uncertainty particularly about the growth of cities, and the influx of immigrants and alien ideas.
- (5) Acceptance and even admiration of the individual enterprise of the economic, politic, or moralizing entrepreneur.

It is hard to say how far Puritanism (considered in its connotative sense) may figure in our censorship scene today. Certainly it was inherent in the background of Comstock himself, and in the times in which he lived. It gained specific support from the wealthy, from such men as Morris K. Jesup, the Colgates, and J. P. Morgan, and spokesman from such men as Comstock and Sumner.

Victorian prudery unquestionably maintained a strong hold in America in the late nineteenth century, a hold which, combined with remnants of the American Puritan thinking, resulted in an emphasis upon carefully guarded morality. In New York at least, the outmoding of Comstockery was probably part of the outmoding of Victorianism.

Psychological insight, in criticism, literature and elsewhere, almost certainly contributed to the decline of Comstockery. Novels, short stories, plays and other writings about New York and other cities in the late 19th and early 20th centuries testify to the fears of the "evil city" and of

the moral as well as political subversiveness of "foreigners." The concern is unmistakable in Comstock's reports.

Inescapably we come back to the man, to the entrepreneur who came to see his "main chance" in reform rather than in commerce, as McCarthy came to see his in attacks on un-American activities, and who brought to it the single-mindedness, unflagging energy, and calculation that made fortunes for other men.

It is fairly clear that the issue is not settled, and that we must educate for poised judgment in such matters. The principal dangers of the future are probably not so much in matters of pornography and obscenity. Increasing psychological sophistication and the example of Comstockery tend to keep us from reacting excessively here. Censorship is not likely to turn on fears of Communist ideology, where we have also had an unforgettable example of excess. It is far more likely to turn on general fear of the violence of "juvenile delinquency" on the part of an aging population, aggravated by difficulties in "manning" our mass educational system. It is quite conceivable that a skillful publicist politician may see a new "main chance" in playing upon such circumstances and fears, coupled with our anxieties about our "technical education" race with the USSR, to eliminate from our schools anything that might tend to "inflame our youth." 279 pages. \$3.60. Mic 57-2805

THE LITERARY SALON IN NEW YORK, 1830-1860

(Publication No. 22,047)

Anne Marie Dolan, Ph.D.
Columbia University, 1957

During the 1830's, '40's, and '50's there existed in New York a literary-social life resembling that of the leading European cities of the seventeenth, eighteenth, and nineteenth centuries. In the growing metropolis men and women of literary tastes opened their homes to individuals of similar interests. Their hospitality was quickly accepted; before long a social life characterized by good conversation and tasteful entertainment was formed.

The literary-social life of New York had always been active. During the middle years of the seventeenth century Jacob Steendam, the Dutch poet, was the center of a literary group. A century later William Livingston, a lawyer, encouraged literary meetings in New York. During the early 1890's the homes of such prominent individuals as John Jay became conversational centers. During the last years of the century Theodosia Burr, the daughter of Aaron Burr, showed promise of becoming a literary hostess, but Burr's tragedy, Theodosia's removal from New York, and her early death ended her social career.

After a lull of twenty-five years the literary-social life of New York again became active in 1825. William Cullen Bryant found intellectual companionship at this time in the homes of several prominent New Yorkers. By the early 1830's some literary hostesses were being praised for their achievements. Others, however, aroused indignation, rather than admiration. James Fenimore Cooper, for example, found the city's literary groups inferior to those of Europe.

By the 1840's the literary salon in New York was well established. Led by the writer, Nathaniel P. Willis, the

newspapers urged women to take the social-literary lead. The propaganda took effect. Of the many New York literary hostesses of the 1840's and '50's, the writers, Anne Lynch, Elizabeth Oakes Smith, Alice and Phoebe Cary, and Estelle Anna Lewis, were the most successful. To their homes came artists, musicians, businessmen, and writers, among whom were Poe, Melville, Emerson, and Alcott. Gentlemen representing the religious, medical, artistic, and business life of the city also became influential hosts.

After the Civil War the literary salon almost disappeared from New York. However, some gatherings continued and a few new ones appeared. Anne Lynch, now Mme. Vincenzo Botta, held literary parties until late in the century. The Cary sisters entertained until 1870. New gathering places were the homes of the poet, Richard Watson Gilder; the journalist, Mrs. Frank Leslie; and the scientist, Henry Draper.

In the early years of the twentieth century salons were held in New York by Willa Cather and by Mabel Dodge Luhan, who has described her social affairs in her memoirs. And as late as World War II a history professor at Barnard College, Mme. Charlotte Touzalin Muret, presided over social meetings of intellectuals.

Literary gatherings will always exist wherever there are literary people. In New York the peak of such gatherings was reached during the three decades preceding the Civil War. The enthusiasm of the literary men and women who came to New York during this time seeking their fortunes resulted in a refreshing and stimulating society, a society which was reflected in much of the literature of the time. 205 pages. \$2.70. Mic 57-2806

THE SENSE OF HISTORY IN GREEK AND SHAKESPEAREAN DRAMATIC FORM

(Publication No. 21,781)

Tom Faw Driver, Ph.D.
Columbia University, 1957

Drama and history have been associated in theory and practice from the time of the Greeks until the present. The attraction of history as subject-matter for dramatists, the necessity of the historian dramatically to re-think and re-enact past events, and the peculiar importance of time in the medium of drama lead one to look for an influence exerted upon dramatic form by cultural presuppositions regarding time and history.

An analysis is made of the Hellenic historical consciousness, revealing in Herodotus and Thucydides, as well as in the Greek philosophers, what R. G. Collingwood calls an anti-historical bias, a tendency to discover meaning by abstracting from history rather than seeing meaning in history. Greek thought is oriented toward space and nature rather than toward time and history.

On the other hand, analysis of Judaeo-Christian historical consciousness reveals a strong cultural preoccupation with history. Israel had a vivid sense of national vocation. A dialectical tension existed between her priests, as guardians of the ritual life, and the prophets, as interpreters of the nation's unique historic destiny under God. Christianity inherited Israel's historical consciousness, made it even more complex, and brought about specific attempts

to formulate philosophies of history. The Judaeo-Christian consciousness was oriented toward time and history rather than toward space and nature.

The second part of the dissertation compares and contrasts four Greek and four Shakespearean plays, in the light of the cultural analyses of Part I. Richard III is discovered to be dominated by images of and references to time, while its culminating battle of judgment and the language surrounding it are found to be parallel to passages in the Book of Revelation. By contrast, The Persians is built upon quantitative images of weight, force, and space, moving not toward judgment but toward revelation of a law of nemesis. Hamlet is shown to involve a fundamental structural movement from knowledge to the surprising events of historical existence, while the Oresteia shows a contrary structure in which the characteristic movement is from events to knowledge. Whereas Hamlet's problem is vocational and is solved by Providence, Orestes' is a moral dilemma and is solved by a synthesis of competing forces.

Macbeth and the Oedipus Rex are examined as to their uses of time. Shakespeare's technique is shown to be that of a careful interweaving of three separate but interdependent meanings of time. Macbeth's revolt against the moral order is an attempt to usurp time and control the future. Sophocles' technique is shown to be that of posing a schematic, ironic relationship between past and present time, in which the past is entirely dominant and the future obliterated. The Winter's Tale is contrasted with Euripides' Alcestis, both tragi-comedies. The principle of reversal in the Alcestis is shown to be a miraculous, forceful interruption of the historical process, while the reversal in The Winter's Tale is actually a completion of the historic process through the surprising fulfillment of early promises and expectations, accomplished through grace in the fulness of time.

Corollaries of the importance of time in Shakespearean drama are the internalization of the action, the increased importance of characterization, the adoption of nature into the realm of the historical, and a sense of the boundlessness of the world and the dramatic action.

The influence of the cultural presuppositions regarding time and history are shown to extend also to matters of linguistic style, the structure and sequence of scenes, and the elements of dramatic form directly related to presentation in the theater. 397 pages. \$5.10. Mic 57-2807

DRYDEN'S IMAGERY IN HIS NONDRAMATIC POETRY

(Publication No. 21,879)

Betty Douglas Evans, Ph.D.
The University of Oklahoma, 1957

Major Professors: Dr. John M. Raines
Dr. John Paul Pritchard

This study of imagery in John Dryden's nondramatic poetry shows that Dryden believed imagery must suit not only the genre and level of style but also the subject matter and tone of the poem. Developed through successive stages, his theory culminated in his definition of wit as "a propriety

of thoughts and words; or, in other terms, thoughts and words elegantly adapted to the subject." Although here he was speaking of the elevated and figurative language of heroic poetry, he later broadened his theory to include all poetry.

When Dryden expanded his idea of propriety, he was forced by necessity to include various levels of style. He always reserved highest praise for the sublime style used in the heroic, the panegyric, and some of the satires. The legislative style, "plain and natural, and yet majestic," was designed for instruction; the homely style, "more free and familiar" than the other two, for narrative verse, certain types of satire, and most prologues and epilogues. Actually a blend of the witty heroic idiom and the relaxed legislative style, this third type allowed the poet freedom to move with perfect propriety back and forth across the middle way to the dignified but not necessarily sublime, then to the satiric but not low comic.

Through his broadened theory of propriety he controlled his imagery and suited it to the various levels of style demanded by the several genres. The sources of his imagery functioned as an integral part of his effort to adapt thoughts and words to subject and tone. In translating the classical poets he used paraphrase, which permitted him to alter his poets' words, expand their thoughts, and intersperse his own figures of speech whose sources he suited to the genre, whether it was epic, pastoral, or satire. Dryden's over-all major sources of imagery were Daily Life and Learning, which reflected the interests of the upper middle class.

Dryden also fitted the type of figure to the genre. He felt that simile was suitable for heroic poetry, where it raised the admiration, and that metaphor had the power to lessen or magnify, especially bold metaphors when judiciously used. Thus the highest percentage of similes appeared in those pieces that were elevated in tone and the highest proportion of metaphors in narrative verse and satire. Personification, associated with the heroic, reached its highest point in the panegyrics, the lowest in the satires. Dryden's naturally luxuriant fancy needed to be controlled by the judgment. When he did not exercise this control, his poetry suffered as in the early poems written under the metaphysical influence.

As his subjects became more informal -- that is, as he shifted from the panegyric to satire and narrative verse -- his images became more spontaneous and natural. By adapting the type of image and the source to the desired tone and genre, he established a harmony that increased the poetical merit of his verse; and as these separate elements were fused, his verse grew in poetical excellence and emerged as an artistic whole.

374 pages. \$4.80. Mic 57-2808

TRADITIONAL SCOTTISH BALLADS IN THE UNITED STATES

(Publication No. 22,013)

Herschel Gower, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Donald Davidson

This study outlines and discusses the Scottish origins of American balladry. Brief attention is given the geographical areas of the United States where Lowland, Highland, and Ulster Scots settled in considerable numbers during the eighteenth century -- particularly the southern states where most of the traditional ballads and folksongs have survived longest.

American versions of British ballads have been published in various folksong collections and in scholarly journals since the beginning of this century, but have almost invariably been classified as English in origin. Therefore, the purpose in this thesis is to discuss the Scottish ballads which emigrated to America, as being separate from English ballads, and to show that Scotland and Scottish settlers were responsible for much of the traditional British balladry collected in the United States.

Using Francis J. Child's five-volume edition of English and Scottish Popular Ballads as representative of British balladry as a whole, this study endeavors to classify English and Scottish ballads as to national origin and to make a clear delineation in American balladry that has not heretofore been attempted.

The conclusion reveals for the first time the extent to which Lowland and Ulster Scots contributed to the folk balladry of the United States and the summary specifies the number of traditional Scottish ballads which entered American folksong tradition.

After analyzing and defining the Scottish ballads, the study outlines the extension of Scottish culture in Ulster and its subsequent appearance in the United States. Corollary chapters deal with the contributions of Ulster Scots and Scottish Gaels, both of which are represented by folk tunes.

Three types of texts are discussed: the emigrant, the transitional, and the naturalized. Examples of these are cited and instances are given which point to the Scottish palimpsest underlying American ballads, most of which have been erroneously classified as English or British. The conclusion is reached that at least forty per cent of the Child ballads collected in the United States are of Scottish origin and that, with its contribution of folk tunes, Scotland was a major force in forming the folk culture of America.

The final chapter summarizes the methods of analysis used in the thesis. It further points out that British and American poets of prominent critical standing have drawn on folk materials as a basis for their literary works, and it emphasizes the fact that much formal literature is closely related to traditional folk art.

228 pages. \$2.95. Mic 57-2809

THE ORIGIN OF THE LEGEND OF THE HOLY GRAIL

(Publication No. 22,014)

Howard Gordon Hanson, Ph.D.
Vanderbilt University, 1957

Supervisors: Professors Rob Roy Purdy, Josef Rysan,
and Max Lancaster

The purpose of this dissertation is two-fold: first, to provide under one cover a bibliography of the scholarship on the subject of the origin of the Holy Grail during the period of the first half of the twentieth century, and second, to evaluate and summarize that scholarship. The work done on the origin of the grail legend in this period was voluminous, although it can be divided, generally speaking, into four separate schools of thought: the Christianists, whose position it was that the grail took its origin from the cup of the Last Supper, or, congruently, from the vessel in which Nicodemus, and later Joseph of Arimathea, was said to have caught the blood streaming from the wounds of the Crucified; the Orientalists, who traced the origin to the Old Testament sacred stones, to Hebrew apocryphal legend, to the Eastern Orthodox ritual or its outgrowths, to sacred stones of the great Eastern religions, or to Western heresies traceable to the East; the Celtists, whose belief it was that the prototype of the grail legend should be sought in one or more of the multitudinous magic horns and cauldrons of the legend and mythology of the British Isles; and the Indo-European school, which asserted that the grail legend represented either a literary survival or a conscious amphibology which had made use of the Indo-European storehouse of ancient ritual, mythology, or mystic symbol.

Each of the four approaches to the problem of grail origin had its advantages and its weaknesses. The Christianist hypothesis was the simplest in that it most nearly conformed to our modern conception of the Holy Grail; but there are several cogent arguments against it: (1) the romance of Chrétien de Troyes, generally considered the earliest, may not have been Christian at all, and has no extant Christian source; (2) had the grail been simply the Mass chalice, it would not have had to have been sought for; (3) it has not yet been explained why the first grail poet departed from orthodox terminology and introduced the all but unknown word "grail." The Orientalist position, although it solved several problems, such as that of the strange grail "procession," brought forward new problems: (1) it rested upon the late German romance of Wolfram von Eschenbach, whose grail was a stone; (2) it suggested a greater degree of aberrance from standard belief than has heretofore been admitted to have obtained in the Medieval Church and among the common people of the Middle Ages; (3) and it usually tacitly assumed that the greatest conteurs of the period were all to some extent tainted with what we now term "heresy." The theory of the Celtists provided an explanation of the "magical" aura surrounding the grail in its first literary appearances, and also suggested prototypes for other motifs of the grail complex; but it failed to present a single Celtic story or legend previous to the grail romances which contained both a monotype of the grail and its related motifs. The Indo-European school had the advantage that, believing that the grail had been a literary symbol for an underlying doctrine, its approach could be more individually interpretive; but the

ritualists could not bridge the more than five-hundred-year gap between the mysteries they thought reflected in the grail romances, and the mythologists and mystics had no way to prove that their assertions of conscious or unconscious esoteric intent were valid.

It is therefore evident that, while the individual can isolate and accept the facets of those theories that most appeal to his sense of the historically probable and of the interpretively equitable, the problem of the origin of the legend of the grail, as far as scholarship as a whole is concerned, is far from being solved; the etymology alone of the *grail* has not yet been agreed upon by the entire body of scholarship in the field. The problem is here analyzed; but what is needed now is an hypothesis which can include the most important discoveries of all these schools of thought.

465 pages. \$5.95. Mic 57-2810

NATHANIEL HAWTHORNE'S ATTITUDE TOWARD TOTAL DEPRAVITY AND EVIL

(Publication No. 21,857)

Alfred Jacob Levy, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Harry Hayden Clark

Nathaniel Hawthorne was neither a believer in total depravity and absolute evil nor was he a transcendentalist; he was a Christian dualist, who accepted the reality, not the finality, of evil and who believed that man was made of "marble and mud," that he was an "amalgamation" of good and evil. Hawthorne never succumbed to the "dark and wretched" aspects of life, although he was aware of them; he always retained a belief in a benevolent and beneficent deity.

Secondly, his use of nature reinforces this idea of light beyond the darkness. Hawthorne always goes beyond physical nature to the divinity in "the turbid mud-puddle"; to the "infinite spiritual capacity" of the human soul; to the "spiritual fountain" which "is kept pure by a wisdom within itself and sparkles into the light of heaven without a stain from the earthly strata through which it had gushed upward." Hawthorne "had faith enough to believe and wisdom enough to know that the bloom of the flower would be even holier than its bud."

Thirdly, man's gift of free-will dignified him as a human and made him responsible for his actions; hence Hawthorne advocated the intense, personal solution rather than external and artificial methods of reform. His own espousal, however, of badly needed naval reforms proves that he did not repudiate all reform *per se* but rejected extremists and unbalanced reformers such as the monomaniac Hollingsworth.

Fourthly, Hawthorne thought man so constructed psychologically that he could do no wrong without intense, inward self-accusation and eventual confession. Without this intense self-examination, or the acceptance of the reality of evil, there could be no movement beyond it.

Fifthly, Hawthorne believed in the possibility of the educative effect of sin. Sin was not necessary for ultimate good but could be, if man learned, the occasion for a more profound good. As long as man did not cynically surrender

to his own despair, as did Goodman Brown, he could attain an insight beyond the sin.

Sixthly, Hawthorne repudiated the chief exponents of total depravity, the Puritans, calling their system "sinister" to both mind and heart. Hawthorne insisted upon an "equipoise" of head and heart lost by the Puritans; although he believed that the heart contained evil, he likewise maintained that "the depths of the heart, or of human nature [are] bright and peaceful; the gloom and terror may lie deep; but deeper still is the eternal beauty."

Lastly, Hawthorne's lifelong faithfulness to the ideals of the Jacksonian Democrats reinforces the idea that he was temperamentally incapable of believing in total depravity or the absoluteness of evil. (The "May and November" chapter in *The House of The Seven Gables* reinforces this.) Furthermore, his experiences as Consul at Liverpool prove he was aware of the social abuses of his day, but these terrible experiences only re-affirmed his faith in the possibility of education through sin, as this idea is worked out in *The Marble Faun*.

His marriage provided the normal perspective he needed to compensate for the loneliness of his early years, when he wrote most of his bleaker and more sombre tales. He tempered his early tendency to moral abstraction by his experience at Liverpool, and although he never rid himself completely of his penchant for moral allegory, his last completed book shows a man writing from experience. It is of tremendous significance, therefore, to grasp the direction of Hawthorne's mind, and *The Marble Faun*, coming after the consulship at Liverpool, is conclusive evidence that he accepted neither the monstrous doctrine that man was totally depraved nor that he was inherently evil.

382 pages. \$4.90. Mic 57-2811

TERMINOS TOPOGRAFICOS EN LA ARGENTINA COLONIAL (1516-1810)

(Publication No. 21,811)

Benjamín Núñez, Ph.D.
Columbia University, 1957

The present study is a research project in American Spanish Lexicography; the specific problem is the nature and degree of the semantic shift of the topographic terms in a specific geographical area and period of time. The main body of this work consists of an inventory and analysis of the topographic terms pertaining to the region of Argentina explored and settled during the colonial epoch. The basic assumption is that the Spanish Language, like other Modern European Languages transplanted into the New World, has undergone a process of adaptation and innovation as a result of the new physical environment and socio-cultural conditions. Only a segment, the Colonial Argentine region, has been chosen, as representative of the whole American area colonized by Spain. In this study "topographic terms" (either words or phrases) means those terms which designate superficial, terrestrial oraquatic characteristics or features. In a few instances some terms referring to vegetation characteristic of Argentina are included.

The results of this study are shown in both sections of the work, the Introduction and the Glossary. In the former

there is a detailed analysis of the terms recorded according to their use and correlated features. There is included a short discussion regarding their use later as place names, which is called toponymic extension. The Glossary, the largest section of this work, contains 443 terms arranged alphabetically in italics and underlined. Generally each term is given two definitions, an Academic and a Colonial one. These are considered basic. Sometimes others, called "standard definitions", are introduced in order to show variations in meaning. The Academic definition is always taken from the 1739 edition of the Dictionary of the Royal Spanish Academy (this is the first edition, known as *El Diccionario de Autoridades*), and the Colonial definition is deduced from the quotations from contemporary written sources. All of these are introduced by the year, with either the author or the work in capital letters, the volume, if any, and the page.

Following are the sources of the material: a) general descriptions of the land, e.g. the maritime and fluvial coastal zones; the piedmont or fertile region of the Andes, where the colonial settlements were organized; and the marginal sections of the plains and the forests of the hinterland; b) long and short accounts of the observations of travelers and explorers; c) a few short stories that are considered to be of special interest. All these sources were originally in Spanish; translations of any kind have been systematically excluded.

The main findings of this study, for obvious reasons provisional, are the following: of all the terms recorded a) 54% are listed in the dictionary of the Royal Spanish Academy (abbreviation: AED) with topographic definitions that agree with Colonial usage; b) 14% are listed with non-topographic definitions in the AED; c) 32% are not listed in the AED. The percentage of differentiation between the Academic definition and the Colonial Argentine usage is 46%. The percentage of the toponymic extension is 49%.

It would be premature to generalize from these findings. The time for generalization will come when other topographic studies of former Spanish colonial regions are made. It is hoped that the present work may serve as a point of departure. 365 pages. \$4.70. Mic 57-2812

THE MIND OF THE ARTIST: COOPER, THOREAU, HAWTHORNE, MELVILLE

(Publication No. 21,923)

Charles Robert O'Donnell, Ph.D.
Syracuse University, 1957

Indirection is a necessary tool of the artist, and it is therefore often fruitless to search for a rational systematization of the attitudes about himself and his role which underlie the artist's creations. But it is unwise to conclude that because some artists do not directly discuss their ideas about the nature and function of literary art, they do not have any ideas. In the depths of his work, one finds the mind of the artist.

The fact that the artistic minds of Cooper, Thoreau, Hawthorne and Melville are similar might be explained in terms of historical time and place; or perhaps in terms of a theory of romanticism; or again in terms of influence on each other. But there is an even more primal connection

between them that needs no external frame within which to view them: they all saw a dilemma involved in being a human being, and they saw in their work the means of articulating and resolving the conflict. Thus we can find in the work of the four artists a kind of definition of the human condition, a kind of uniformity of vision. All seem to view man as living in a world where, because of his limitations, he is unable to know absolutely, where he must create his own forms. It is only through the undying efforts of his will that man is able to create and maintain the illusion of order, of permanence.

The artist, however, sees in the world of action, in the common patterns of belief, the possibility of corruption; he sees the illusion of knowledge becoming the delusion of power. Civilization corrupts, and yet the artist cannot violate the great heart of humanity by isolating himself. Faced with a dilemma, the artist finds his resolution in the symbolic imagination, in the creation of his own worlds of illusion, in the creation of a form within which the conflicts can be articulated and defined. Characters in the work of the writers under discussion are often concerned with finding themselves in relation to forces pulling them in opposite directions.

A common symbol for the artistic dilemma is the conflict between civilization and the wilderness. Civilization suggests social integration, mankind's delusions about himself, a focus on human accomplishments and human control; wilderness suggests spiritual isolation, self-knowledge, a focus on the humbling forces of an unknowable nature.

Finding himself between two worlds, each containing both good and evil, the artist symbolically reconciles the irreconcilable. He becomes the maker, the constructor of esthetic worlds with which to confront the perplexities of the world he lives in. He creates patterns of illusion within which the reader may experience the complexity of the human condition. The work of art defines the human condition, the realm within which all moral action must take place.

For the most part, then, this dissertation is concerned not with establishing relationships in terms of literary history, but with seeing similar patterns of artistic assumption in selected works of Cooper, Thoreau, Hawthorne and Melville. The concern is primarily with the artistic temperament, with the artists' vision of the nature of the world and their own roles in that world.

189 pages. \$2.50. Mic 57-2813

THE REGIONAL FICTION OF UPSTATE NEW YORK

(Publication No. 21,924)

Thomas Francis O'Donnell, Ph.D.
Syracuse University, 1957

Since 1930, the "new regionalists" of upstate New York—the state, that is, less New York City and Long Island—have been remarkably active, producing more than 140 novels and collections of stories in which upstate landscape, history, and manners are treated as organic fictional elements. This flourishing literature is itself a part of the continuing development of the upstate area as a region, with cultural and social as well as geographical

characteristics that distinguish it from other regions, including metropolitan New York. It represents, furthermore, a new phase of an indigenous upstate literary tradition which began in colonial days and developed until the end of the nineteenth century. This dissertation traces the growth of that tradition to 1898, when it was fully-formed and ready for adaptation to twentieth century techniques and ideas of the "new regionalists."

Although a number of seventeenth and eighteenth century Yorkers wrote appreciatively of their surroundings, the real foundations for upstate regional fiction were laid in the thirteen New York novels of James Fenimore Cooper. In his artistic use of landscape in these novels Cooper actually created a Region Visible; Cooper's readers could see the state as it had not been seen before. Furthermore, in his treatment of upstate history and his contribution of a body of myth in the Leatherstocking Tales, Cooper did more than any other writer before or since to create a Region Invisible. Altogether, he bestowed on upstate New York a personality it could not claim before, and provided a familiar frame of reference for subsequent regional writers.

Two contemporaries contributed to the tradition that Cooper had so firmly planted in upstate soil. James Kirke Paulding, in some tales and one novel (*The Dutchman's Fireside*), provided the only authentic and significant literary art to emerge from the rapidly-fading Dutch cultural strain in upstate society. In central New York, Mrs Frances Whitcher excoriated the bad manners and questionable morality of her transplanted New England neighbors in the posthumously-published *Widow Bedott Papers*.

From 1855 until well after the Civil War no new writers appeared to add to the upstate literary tradition; the regional impulse was kept alive, however, by state and local historians, whose work was to prove invaluable to later regional writers. Two writers of fiction, Philander Deming and Marietta Holley, after promising starts in the '70's failed to live up to early promise. Deming produced only a score of vividly realistic local color stories of Adirondack life, and Miss Holley turned to grinding out her interminable and now unreadable "Samantha" series.

In Harold Frederic, however, upstate New York produced another true literary artist, and a worthy successor to Cooper as regional novelist *par excellence*. In his New York fiction, from *Seth's Brother's Wife* (1887) to *The Damnation of Theron Ware* (1896), Frederic demonstrated that the regional impulse can be adapted to the technique of realism as well as of romanticism. Pushing beyond the bounds of local color and veritism, Frederic probed to the roots of upstate life in a number of aspects—religious, economic, sociological, and even aesthetic—and left a comprehensive and artistic picture of a living regional society.

With the publication of Edward Noyes Westcott's popular, but poorly-rendered *David Harum* (1898)—significant because it ended the long-standing literary feud between Yankees and Yorkers—the regional impulse became dormant in upstate New York literature. A few writers were to appear during the first decades of the new century, but only to follow patterns already established. The tradition itself, firmly rooted by 1898, now awaited the arrival of the "new regionalists." 383 pages. \$4.90. Mic 57-2814

DIDEROT AND LA METTRIE

(Publication No. 21,122)

Jean Ashmead Perkins, Ph.D.
Columbia University, 1957

The works of Diderot and La Mettrie present a series of similarities and some marked differences, an examination of which enables us to arrive at special insights. Their contemporaries noted certain obvious points of similarity, such as their atheistic, materialistic, and deterministic outlook, and they even attributed Diderot's first original work, the *Pensées philosophiques* (1746), to La Mettrie who was already known through his *Histoire naturelle de l'âme*. (1745).

In the field of natural philosophy both authors accepted the ancient doctrine of a universe made up of atoms and void. The main problem of this type of materialism is that of sensation and consciousness, since there is no unifying principle to account for these phenomena. La Mettrie posited motion as one of matter's attributes but was unable to arrive at an adequate explanation of the development of inanimate into animate matter, remaining within the fold of mechanical materialism. His premature death in 1751 prevented him from contributing to the speculation of the second half of the century, when a new trend towards a more dynamic outlook was evident. Many authors developed this idea which had its roots in the philosophy of Leibniz, but it was Diderot who best utilized it, positing a universe of heterogeneous molecules which in combination produce organisms possessing characteristics different from those of the individual units. Change now involves a dynamic force which produces a real change of being. His theory is infused with a belief in the value of the emergent organism, and it differs sharply from that of La Mettrie who refused to recognize the place of qualitative differences in the universe.

In the field of epistemology there is a basic similarity since both authors were empiricists. But Diderot was aware of a qualitative difference between man and the animals, a difference La Mettrie chose to ignore. This is particularly noticeable in their concept of the self. To La Mettrie the self is merely the sum total of all a man's fleeting sensations of which the mind is a passive receptacle. Diderot stressed the active nature of the mind, noting in particular the rôle of the physical organization of the brain in the creation of a living personality.

This concept of the self as an emergent organism also plays an important part in Diderot's ethical theories, enabling him to escape from the narrow limits of mechanical determinism in which La Mettrie remained confined. The active self in Diderot's scheme means that each man is a dynamic centre of force, both a determined and a determining factor in the universe.

In the field of stylistics we again find an organic unity characterizing Diderot which is not true of La Mettrie. Contemporary critics criticized the lack of unity in both authors' works, but modern scholars have shown how form and content are intimately wedded in the works of Diderot.

The major difference between these two authors resides in the concept of dynamic organism which permeates the whole of Diderot's literary output. This in turn involves an appreciation of the value of the achievements of the human mind, which contrasts severely with La Mettrie's cynicism. From the point of view of the history of ideas

the major interests and developments of the age, beginning with the combination of Cartesian naturalism and Epicurean atomism common in the first half of the century and moving on to the inclusion of Leibnizian dynamism current in the second, can be traced in their works. A remarkable change took place, and a comparison of these two particular authors helps us understand these developments.

286 pages. \$3.70. Mic 57-2815

JAMES HALL: A BIOGRAPHY

(Publication No. 21,648)

Randolph Randall, Ph.D.
Columbia University, 1955

This biography is the result of an attempt to establish a canon of the writings of James Hall and to consider his literary works and the events of his life in relation to cultural conditions on the Middle Western frontier, where most of his writing was done.

A cultivated Philadelphian, he moved in his twenty-third year to the frontier town of Pittsburgh; four years later, in 1820, he removed to Shawneetown, Illinois, and definitely cast his lot with the West. During the thirteen years of his residence in backwoods villages of Illinois, he wrote most of the works upon which his literary reputation rests. In 1833 he settled in Cincinnati, where he resided until his death thirty-five years later. Earning his living as a soldier, lawyer, prosecuting attorney, judge, state treasurer of Illinois, and banker, he devoted only his leisure time to literature. Yet he had great energy, and he became the frontier's foremost author; at the same time he was active in the establishment of schools, a college, a historical society, and lyceums.

The principal records of Hall's observations are Letters from the West and Statistics of the West. Letters from the West (1828) is valuable for his sharply etched portraits of emigrants caught at dramatic moments of their Westward migration, as well as for his romantic descriptions of the pristine forests and his emphasis upon the emigrants' enthusiasm and spirit of adventure. Statistics of the West (1836), a collection of his periodical essays on the natural history of the Middle West, is characterized by reliability and by a fresh and readable style. One historical work, Sketches of History, Life, and Manners in the West (1835) also is based partly upon his own observations.

Hall's editorship of two frontier newspapers--the Illinois Gazette (1820-1822) and the Illinois Intelligencer (1829-1832)--was marked by such liberality, courage, and literary quality as to make them outstanding journals. As editor of an annual, The Western Souvenir (1828), he was the first to publish a collection of Western short stories. In editing the Illinois Monthly Magazine (1830-1832) and its successor, the Western Monthly Magazine (1833-1836), he attempted to stir the West to cultural consciousness. In the latter journal, in which he enjoyed considerable success, he evinced both a strong bias against abolitionism and a strong enthusiasm for religious freedom. The magazine played a significant part in the development of Harriet Beecher Stowe, as well as of a number of lesser writers.

Though Hall wrote one novel, his best fiction is to be

found in his thirty-four short stories, most of which were collected into Legends of the West (1832), The Soldier's Bride and Other Tales (1833), and Tales of the Border (1835). He declared that his sole intention in writing his tales was "to convey accurate descriptions of the Western scenery and population." In "The Bachelor's Elysium" (1821), he portrayed, apparently for the first time in American fiction, the uncouth frontiersman. For characterization and fidelity to scene his "The Divining Rod," "The French Village," and "The Silver Mine" were noteworthy pieces of early American realism. Hall's shortcomings as an author of fiction were the principal defects of the short story writers of the age--faulty structure and, particularly, lack of dramatic effect. Although Irving was the predominant American author of short tales of the period, Hall occupied a leading position in the craft between 1824 and 1832, when Irving published no short narratives and before Poe and Hawthorne began to demonstrate their best artistry in brief fiction. 340 pages. \$4.35. Mic 57-2816

MATTHEW PRIOR AND ALEXANDER POPE: THEIR PERSONAL AND LITERARY RELATIONSHIP

(Publication No. 22,022)

Frances Mayhew Rippy, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor John Aden

As contemporary English poets, Matthew Prior (1664-1721) and Alexander Pope (1688-1744) held in common a wide circle of friends--of both parties and sexes and many ranks and professions. Several of these mutual friends--and Prior and Pope themselves--testified to a friendly acquaintance (informal though never intimate) between the two poets and to several meetings between them during the years 1717-1721, the zenith of Prior's literary fame.

Probably because of the influence after 1725 of Bolingbroke, who bitterly distrusted Prior, Pope came to disparage Prior's personal life, declaring that Prior was "not a right good man" and "nothing out of verse." But Pope never altered his high opinion of Prior's literary art. He had assisted in bringing out Prior's 1718 subscription edition of Poems on Several Occasions; two years after Prior's death Pope undertook at the suggestion of Lord Harley a posthumous edition of those pieces by Prior not included in the earlier volumes. Harley, who controlled the Prior manuscripts, never permitted the edition to appear, but two manuscript collections of Prior's poems now at Longleat, Wiltshire--the "Poetical Miscellanies" (Longleat 28) and the "Miscellaneous Pieces in Prose and Verse" (Longleat 29)--indicate Pope's editorial labors on this edition. The first bears numerous comments and alterations in Pope's own hand; the second contains a resume of several later changes projected by Pope. Although listing five grounds upon which he planned to delete pieces, Pope seldom marked for omission any complete poem of more than fifteen lines or any shorter piece which was polished or effective. He added and emended titles, altered spellings, filled in letters in blanks, marked elisions, capitalized, changed order, added and substituted words--all in conformity to Prior's general practice.

Thus in a peculiarly advantageous position to evaluate Prior's poetical achievement, Pope included Prior (along with Dryden) among the six unlimited authorities for English poetical language. Pope classified Prior as a member of the same hudibrastic, anti-Petrarchan, burlesque school of poetry as John Suckling and John Mennis. He praised Prior's prose *Dialogues of the Dead* and certain of his tales and lighter pieces, expressed a preference for his *Alma* over his *Solomon*, suggested a pre-publication revision in *The Conversation*, and quoted from Prior's *Ode, Humbly Inscrib'd to the Queen*. Prior, on the other hand, exhibited only a casual, if amicably respectful, interest in Pope's work.

Prior's poetry likewise owed little to the influence of Pope, except in the much-disputed two versions of *The Old Gentry*, but Pope's poetry occasionally shows the impact of Prior's work. Three epigrams attributed to Pope are associated with epigrams by Prior. Pope's *Adriani Morientis ad Animan* and his *Christiani Morientis ad Animam* were written specifically to compete with Prior's *Adriani Morientis ad Animam Suam Imitated*. Pope's *Eloisa to Abelard* may have resulted from his desire to emulate Prior's *Henry and Emma*; at any rate, it probably owes to Prior's piece certain variations from the previous treatments of Héloïse's letters and certain verbal patterns. The portions of Pope's *Essay on Man* which deal with the Pyrrhonic doctrine of the limitations of man's reason bear close parallels to Prior's treatment of the same problem in his *Solomon*. Finally, Pope's *Imitation of the Sixth Satire of the Second Book of Horace* and his *First Ode of the Fourth Book of Horace* imitate the same Horatian matter as Prior's *Hind and the Panther*, *Transvers'd* and *Cantata*, respectively, but owe to him only an occasional detail or turn of phrase.

A transitional figure between the Restoration and Augustan periods, Prior retained much of Restoration language, lyricism, and levity, along with certain non-heroic-couplet verse-forms. It is, as Pope himself suggested, in some measure because of Prior that this burlesque school of poetry survived as a minor element in Augustan verse--and even in the poetry of Pope himself.

555 pages. \$7.05. Mic 57-2817

WELSH PLACE-NAMES IN THE EARLIEST ARTHURIAN TEXTS

(Publication No. 21,815)

Ruth Eloise Roberts, Ph.D.
Columbia University, 1957

This dissertation is devoted to a study of the localities in Wales which are associated with the Arthurian legend in texts written in Wales before 1100 and in the Arthurian section of Geoffrey of Monmouth's *Historia Regum Britanniae*, finished in 1136-8. The chief texts considered are the *Mirabilia* (included with most versions of Nennius's *Historia Brittonum*, c. 800), the Welsh prose romance, *Culhwch ac Olwen* (late eleventh century), and Books VI,xvii through XI,ii of the *Historia Regum Britanniae*.

The geography of Wales has played an important part in the development of Welsh literature and tradition. The Welsh, like the Irish, seem to have had an especial interest

in places and in their names, and it is often possible to perceive the growth of legend as a result of speculation about the origin of a place or of its name. In addition, an absorbing interest in marvels and wonders is typical of early Welsh literature, whether Arthurian or not, and it has contributed, along with a preoccupation with topography and monuments and ruins of the past, to the growth of Welsh tradition.

An interest in marvels is paramount in the *Mirabilia* (c. 800), where the earliest recorded instances of the localization of Arthurian legend in Wales occur. Both instances are concerned with an explanation of the origin of a prehistoric monument: a cairn on Corn Gafallt in northern Brecknockshire and a tumulus at the source of the Gamber Brook in southwestern Herefordshire. A comparison of Nennius's allusion to the hunting of porous Troit, localized at Corn Gafallt (Carn Cabal), with the tale of the hunting of the same boar, Twrch Trwyth, in *Culhwch ac Olwen*, strongly suggests that even before Nennius's time the incident at Corn Gafallt was an integral part of a widespread tradition of Arthur's hunting of the wild boar, a story preserved in great detail in *Culhwch ac Olwen* three hundred years after the *Mirabilia* were recorded by Nennius.

The foremost example of the significant role played by geography and place-names in the development of Welsh tradition is the Welsh romance, *Culhwch ac Olwen*. The greater portion of the story of the hunting of Twrch Trwyth, for instance, is an onomastic tale. This episode contains the most detailed and obvious onomastic allusions, but the same interest in places, in the figures connected with them, and in traditions concerning them is strong throughout the entire narrative. Many of the implications of the names of places or personages mentioned were lost upon the late eleventh-century redactor of the story of *Culhwch*, but it is apparent that much of the material which this storyteller and various storytellers before him had at their disposal was, at least in part, onomastic in character.

Even a study limited to an examination of the Welsh localities which Geoffrey of Monmouth associated with the Arthurian legend in the *Historia* reveals that Geoffrey, like Nennius and the unknown redactor of *Culhwch*, shared the great interest in onomastic tales, in topography, and in prehistoric and Roman remains which was most characteristic of the generations of Welsh storytellers whose work lay behind the extant written texts. In each instance of Geoffrey's use of a Welsh setting there is at least a possibility that, whether he knew it or not, he was recording antecedent tradition associating the Arthurian legend with the locality. This is hardly surprising, for the majority of the Welsh places which Geoffrey mentions are in the vicinity of the Wye valley in southeastern Wales, where there is evidence (in the *Mirabilia* and in *Culhwch*, for instance) that stories of Arthur were localized long before 1100.

195 pages. \$2.55. Mic 57-2818

YOUNG LEO TOLSTOY AND LAURENCE STERNE

(Publication No. 21,820)

Peter Rudy, Ph.D.
Columbia University, 1957

In December 1850, Leo Tolstoy read Laurence Sterne's *A Sentimental Journey through France and Italy*, and this was the beginning of a literary relationship which had a marked influence on young Tolstoy's creative growth.

The account of Tolstoy's dependence on Sterne must start with the middle 1840's. At that time, Tolstoy began to elaborate and practice a philosophical methodology which he considered highly original and effective. When he read *A Sentimental Journey* in December 1850, he found that Sterne made frequent use of certain expository devices that were analogous to those in his own methodology, and this circumstance suggested to him his first plan for a literary work.

At least as early as March 20, 1851, Tolstoy was reading Sterne's *Sermons* and this experience almost deflected him from his original philosophical-literary orientation; however, he quickly returned to his first position. "A History of Yesterday," the story written between March 26 and April 16, 1851, shows a thematic and structural tie to the December 1850 plan and also a further adaptation of Sternian devices, almost all of which have a common basis with Tolstoy's philosophical methodology.

In April 1851, Tolstoy was stimulated by Sterne to experiment with the sermon genre. June 1851 finds him still reading Sterne's *Sermons*; Richard Griffith's Sternian imitation, *The Koran*; and *The Life and Opinions of Tristram Shandy, Gentleman*.

Various compatible and incompatible elements from Sterne and pseudo-Sterne are apparent during the work on the drafts of Tolstoy's *The Four Epochs of Development*, a novel which occupied his attention from sometime after July 4, 1851 until January 1852. This period was one in which Tolstoy reshaped the older, assimilated Sternian elements and introduced those from Sterne and, to a very limited degree, those from Griffith that were new. Rechristened as *Childhood*, this project was finally completed by July 3, 1852; and it showed a Tolstoy who was more than ever dependent on Sterne, but now in a more subtle manner.

Tolstoy's completed or significant fiction between the latter half of December 1852 and the early days of December 1856 continued the tie with Sterne: he preserved, to varying degrees, many of the assimilated Sternian elements, formed new adaptations of these, and also introduced new loans from his "favorite writer." In the works finished from the latter half of December 1856 through 1862, the Sternian complex is generally weaker, with respect to both the familiar elements and new variations and loans.

Tolstoy's relationship with Sterne shows several characteristics. (1) In the main, he utilized those Sternian elements which had a common basis with his philosophical methodology. (2) Probably the most useful lesson that Sterne taught him was the manipulation of the minor thought accretions of his characters. (3) The integration of Sternian elements into Tolstoy's fiction provoked creative struggles. (4) In Tolstoy's hands the Sternian complex was in a constant state of flux; the component parts went into endless permutations, they developed into new forms, and they were augmented by new loans from Sterne. (5) Finally,

Tolstoy found the Sternian elements most useful in his "domestic" novels. 332 pages. \$4.25. Mic 57-2819

THE VILLAINESS IN ELIZABETHAN DRAMA

(Publication No. 22,025)

William Edwards Taylor, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Joseph A. Bryant, Jr.

The purpose of this thesis is to trace the development of the villainess in the drama of the English Renaissance. In the thesis, *villainess* is defined as being any feminine character in the drama who, "for a selfish end, wilfully and deliberately violates standards of morality sanctioned by the audience or ordinary reader."

Three major influences contribute to the Elizabethan concept of feminine villainy: the domestic influence, the Senecan influence, and the Italian influence, particularly as it is seen in the Italian *novella*.

The domestic influence is essentially of ecclesiastical origins. It amounted to a prejudice against the female sex that held all women to be weak, perverse, and hence in need of strict control and discipline. Woman is the daughter of Eve and as such the cause of man's fall. Should she violate her "place" of subservience to man, she is immediately caught in a "chain of vice" which begins with her lust for finery and ends with murder. The domestic concept of feminine villainy not only contributes to the generalized Elizabethan concept of feminine villainy, but becomes the dominant concept in the domestic drama of such a playwright as Thomas Heywood.

The Senecan influence enters the Elizabethan drama through the many popular translations of Seneca, which were completed by 1581, and through the adaptations of Senecan drama in the universities and the Inns of Court. Four feminine types may be distinguished which contributed to the Elizabethan concept. They are the Female Revenger, as in Clytemnestra and Delanira; the Agent of Evil Fate, as in Helen; the Victim of Guilty Passion, as in Phaedra; and the Devil Woman, as in Medea. In the Inns of Court and university dramas, these types are merely translated into the English plays; in the drama of the period of Kyd, the domestic and the Senecan influences are just beginning to blend and are struggling for mastery of the imaginations of the dramatists; in the later popular drama, the Senecan types function suggestively to enrich the evil of such basically domestic females as Alice Arden and Lady Macbeth.

The latest influence to affect the Elizabethan concept of feminine evil is the Italian. In the translations of the *novelle* done by such Englishmen as William Painter, Geoffrey Fenton, George Turberville, George Pattie, and others, the Elizabethan playwright found indications of the ecclesiastical prejudice as well as many references to Senecan villainesses. He also found woman perpetrating the most horrible crimes merely to satisfy their boundless lusts and their fiendish imaginations. Furthermore, he found villainesses operating in a depraved foreign atmosphere.

The Italian villainess may be seen in almost her pure

form in The Insatiate Countess of John Marston and at her highest artistic development in the Vittoria Corombona of Webster's The White Devil. She is seen as a contributing factor in the women of Middleton's Women Beware Women and The Changeling. Other Jacobean dramas reflect the Italian influence in varying degrees.

By 1625 the Elizabethan concept of feminine villainy has been formed and its development completed. An acceptable generalization would be that the English dramatist enriched his domestic heritage by adding to it the ideas he found in the plays of Seneca and in the translations of Italian story, but each individual dramatist found one of the three concepts more congenial to his own creative temperament than the others and so emphasized it in his villainesses. 402 pages. \$5.15. Mic 57-2820

JOHN ESTEN COOKE: A CRITICAL BIOGRAPHY

(Publication No. 22,028)

William Edward Walker, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Richmond Croom Beatty

This study of John Esten Cooke, based on his letters, notebooks, and publications and on material written about him, attempts to re-create his life and milieu to show that he did not blindly write to "glorify" the Old South, of which he was more the social historian than the advocate. A man of moderate temperament, attributable in great part to his birth in the western part of Virginia and to his never-ending ties with that democratic region, he first wrote books in which the most admirable characters did not trace their genealogies back to the Cavaliers who took refuge in America when Cromwell took control in England. But these characters, democratic in outlook, were true cavaliers and gentlemen in the same sense that their creator was: they were kind, polite, considerate, gentle people who respected the sanctity of the human heart. Cooke's remark in 1855 that his The Virginia Comedians was "profoundly democratic, and American--the aristocracy whom I don't like getting the worst of it" might well summarize his ideas before the Civil War. He himself had suffered through the bankruptcy of his father and had found it necessary to work unusually hard at law and letters to earn a living.

Just as his democratic characters of fiction were capable of strong feelings and effective actions when anyone--George III, for example--threatened to endanger their way of life and to disregard them as human beings, John Esten Cooke was capable of fighting valiantly and daringly against the Federal Government when it threatened to bring dishonor upon his beloved Virginia. He "followed the feather" with Jeb Stuart, and after the War, which had forced him to take an extreme pro-Southern position, his writings were subtle and thorough defences of the Southern cause, such defences being disguised in melodramatic and sensational plots. It was then that he began to call himself the writer of the Cavaliers.

After the interest in War stories waned, Cooke attempted to return to subjects dealing with Old Virginia, but he was unsuccessful, for he was never able to rid himself

sufficiently of the sensational elements he had used. His promising literary development had been blighted in its early youth; consequently his best books are his early books, with Surry of Eagle's-Nest being, perhaps, his best Civil War novel.

It would be foolish to demand for Cooke a high position in American literature; his literary faults are many, and sometimes grievous. He was guilty of lapsing into sentimentality, of mistaking bravado for bravery, of dealing wildly with sensationalism, of not always facing squarely the sterner phases of life, and of forgetting, in his haste, the demands of art.

Offsetting these weaknesses, however, are many interesting stories, many fine and lovable characters which have come from his pen. He dramatized American history from the founding of Jamestown through the problems of Reconstruction. While he did not deny harsh realities, he showed in his books that idealism need never surrender to them. It would, therefore, be unfair to deny him a place of importance in the literary history of America. It was writers like Cooke--and Bagby and Simms--that maintained an equilibrium in American literature between the domestic novelists like Mrs. E. D. E. N. Southworth and the highly esthetic writers like Emerson, Thoreau, Hawthorne, and Melville.

If critics would refuse him a secure place as an artist, they will have to admit him into the ranks of those social historians who have worked laboriously to preserve for Americans a picture of the past life that has made possible the present greatness and bright future of the America of today. 769 pages. \$9.75. Mic 57-2821

LANGUAGE AND LITERATURE, CLASSICAL

AESCHYLUS' DANAID TETRALOGY: A STUDY

(Publication No. 21,835)

Emily A. Wolff, Ph.D.
Columbia University, 1957

The purpose of the dissertation is to examine the evidence for the date of Aeschylus' The Suppliants, to relate The Suppliants to Aeschylus' other extant plays in subject-matter and technique, and to ascertain its place in the body of his work.

On grounds of internal evidence, The Suppliants has generally been regarded as Aeschylus' earliest surviving play, composed about 490 B. C. A papyrus fragment published in 1952 (Oxyrhynchus Papyrus XX. 2256, Fr. 3) supplies the first direct external evidence bearing on the date of The Suppliants. This papyrus, which comes from the argument to a play, states that a tetralogy by Aeschylus, of which the last two plays were Danaids and Amymone, won first place over Sophocles in a competition. The Suppliants is generally considered to be the first play of this tetralogy. Therefore the papyrus would seem to show that The Suppliants belonged to Aeschylus' later work. If this is true, the criteria which scholars have hitherto used in tracing an author's development must be drastically revised.

The first chapter treats the chronology of Aeschylus' extant plays, and the special problems connected with The Suppliants and Prometheus, which are the only extant plays of Aeschylus whose dates are unknown. Prometheus is argued to be authentic, and is estimated to be one of Aeschylus' latest works.

The second chapter considers the problem of how The Suppliants fits into the body of Aeschylus' work. Aeschylus' sources for the Danaid legend and his adaptation of the legend are discussed. The plays of the Danaid tetralogy are concluded to have been The Suppliants, Egyptians, Danaids, Amymone. The fragments and subject-matter of the lost plays are discussed.

The characteristics of The Suppliants and the Danaid tetralogy are then examined: first, possible allusions in The Suppliants to contemporary events; second, the qualities of The Suppliants, grouped under the topics: technique (structure, setting, characterization, language, style, metre) and tragic concept and theology. Under these same headings, Aeschylus' other extant plays are then compared with The Suppliants. From this body of internal evidence the conclusion is drawn that The Suppliants is Aeschylus' earliest extant work and was probably composed either between 493 and 490 or between 490 and 481.

The third chapter deals with the problem of dating the Danaid tetralogy. The conclusions drawn from the internal evidence are summarized, and the external evidence is presented: first, the Oxyrhynchus Papyrus; second, indirect evidence, offered by vase-paintings, which may be connected with posthumous performances of the Danaid tetralogy. The balance of probabilities of the external and internal evidence leads to the conclusion that the Oxyrhynchus Papyrus records either a posthumous revival or a posthumous first performance of the Danaid tetralogy. There is ancient testimony to support both these hypotheses; and the Oxyrhynchus Papyrus, as it stands, might refer to either type of performance.

The last chapter considers how the evidence of the Oxyrhynchus Papyrus affects our appreciation of The Suppliants and of Aeschylus' work as a whole. If the Danaid tetralogy won first place in a competition held after Aeschylus' death, the archaic and awkward elements in the structure of The Suppliants, and the difficulties of language and style, did not prevent the play from having a lasting appeal to Athenian audiences. The Suppliants is interesting because it combines the mature technique of the Thespian lyric tragedy with Aeschylus' experimental technique, and because it expresses concepts which are central in Aeschylus' later work. But The Suppliants also deserves appreciation in its own right as a work of art whose form and thoughts have perennial interest.

265 pages. \$3.45. Mic 57-2822

LANGUAGE AND LITERATURE, LINGUISTICS

A STUDY OF FOREIGN WORDS OCCURRING IN THE HEBREW AND ARAMAIC OF THE OLD TESTAMENT

(Publication No. 21,783)

Maximilian Ellenbogen, Ph.D.
Columbia University, 1957

The present dissertation deals with the problem of the extent of foreign vocabulary in Biblical Hebrew and Aramaic. It is in part a critical compilation, and in part an original contribution to the elucidation of the problem, and purposes to make clear some of the cultural influences which have been operative in the land of the Biblical literature.

Even a cursory reading of the material assembled here will make it abundantly clear that this literature was not composed in an atmosphere of cultural isolation, but that, on the contrary, it was produced in a land which, partly by reason of historico-political connections, and partly because of trade relations, was subject to numerous cultural influences, and imported words along with both ideas and things.

One very significant fact emerges from this study, namely, that the overwhelming majority of foreign words to be found in the Old Testament refers to things - vessels, instruments, fabrics, products of foreign countries - where the words, taken over with the things imported from abroad, were adopted into the language and quickly became part of the normal vocabulary.

Most of the words dealt with here are of well ascertained meaning. In some cases, however, it would seem that sufficient supporting material has been adduced here to warrant a change in the traditional translation of the word. In the case of each word discussed in this study the writer has endeavored to elucidate its etymology as fully as possible, or at least to trace it back to the earliest ascertainable source. In collecting the material considerable attention has been paid to the Versions, particularly the Targums, the Septuagint, the Vulgate and the Peshitta, for where they have obvious difficulty with a word there is at least a suspicion that it may be a foreign word.

In investigating the various words included in this study one principle was adhered to strictly, viz. that the conclusions arrived at had to be consonant with known linguistic, historical and archaeological facts, had to make sense and fit the Scriptural context.

Numerically the largest group of foreign words is that from Akkadian, which constitutes nearly fifty per cent of the words studied, if one counts the words of Sumerian origin which would seem almost invariably to have come into Hebrew and Aramaic through Akkadian. This is followed by Egyptian, which comprises roughly twenty-two per cent of the words, and then by Iranian, which includes about eighteen per cent of the total. The remaining ten per cent includes words of Indian and Greek origin, as well as certain words whose origin cannot yet be definitely established.

211 pages. \$2.75. Mic 57-2823

LANGUAGE AND LITERATURE, MODERN

RAMÓN PÉREZ DE AYALA: A CRITICAL
STUDY OF HIS WORKS

(Publication No. 22,032)

Robert Lundy Bancroft, Ph.D.
Columbia University, 1957

Ayala's works merit studious attention because of their individuality and masterly composition. This study undertakes to deal with them as a unified whole.

The poetry has its main significance as an integral part of the total works. Before 1915 its technique and tone, along with early French influence, show a relationship to the modernista movement. Nature has a special place in the earlier poetry. The general theme is alienation, to which later is added that of concern for the welfare of Spain. From 1915 on the poetry expresses intellectually rather than in sensual images the concept of a universe in which a fundamental harmony reigns. Syntax and verse are generally prosaic.

The essays elucidate the themes of the second period, 1915 and after. They reveal that Ayala, as he writes on such diverse subjects as the theater, political problems, or art, has always the understanding of Spain or the reinvigorating of Spanish society as a discernible motive. They earn their author the status of a major essayist.

The novels of the earlier period, autobiographical in large part, are an essentially realistic treatment of the predicament of the artist who is at odds with life. The seeking of a workable relationship between him and the world is their major theme. The central problems are love, sensuality, sensibility, and artistic expression.

In the three major novels, Belarmino y Apolonio, Luna de miel, Luna de hiel and its sequel Los trabajos de Urbano y Simona, and Tigre Juan and its sequel El curandero de su honra, all written in the 1920's, a dynamic relationship between the real and the intellectual produces the principal structural irony of each work. The characters have a comic quality that stands in contrast to their ordinary existence. Action and setting that are works of fantasy alternate with realistic scenes.

The eighteen short stories, beginning in 1902 and continuing intermittently until 1924, confirm the characteristics revealed by the longer fictional works: ironical humor, a critical view of humanity and society, and, in the second period especially, the conversion of ordinary reality into a poetic and symbolic world constructed around certain basic human problems.

The quality of individuality is outstanding in Ayala's art as a prose writer. Characterization emphasizes what is most particular in the personages. Presentation of contemporary society and manners is commonly an expression of the author's ironical view; it is at times a symbolic or near-mythological device. The Asturian setting, when treated realistically, is a partial picture selected for literary purposes; after the earliest novels it is presented in a completely personal interpretation. The style is distinctive for the skillful exploitation of contrasts and unexpected associations, as in the play of learned and ordinary words and in the incongruities between language and content.

Among the literary influences, classical literature is extremely significant because of Ayala's adaptation of

myths to modern situations, and because of his conversion of modern situations into near myths. Biblical motifs are prominent, and the Genesis story helped form the author's view of the character in his environment. English literature had considerable influence. The novels of Galdós and Leopoldo Alas strongly affected Ayala's.

His fundamental concepts of man and the world progress from the view of man as frustrated and the world as anarchistic, to the view of man as endowed with the power of constructive action and of the world as having essential order.

What is most individual in Ayala's work is the ironical humor, particularly as it comes to be, in the second period, the very essence of the three major novels.

241 pages. \$3.15. Mic 57-2824

A WORCESTERSHIRE MISCELLANY: COMPILED BY
JOHN NORTHWOOD, c. 1400, EDITED FROM
BRITISH MUSEUM MS. ADD. 37,787

(Publication No. 20,266)

Nita Emeline Scudder Baugh, Ph.D.
Bryn Mawr College, 1939

The manuscript, of which the Middle English texts are here edited, is a collection of religious pieces in prose and verse, in Latin, French, and English. Most of the English texts are in verse, and the collection includes such pieces as Two Songs of Love Longing, a Prayer to the Trinity, and a version of the Disputation between the Body and the Soul. It once contained The Stations of Rome, but at this point the manuscript is mutilated and only the last seven lines are preserved. All but one of the English texts are known in versions found in other manuscripts.

A colophon states that the manuscript belonged to John Northwood, who entered St. Mary's Abbey, Bordesley, as a novice in 1386. Bordesley Abbey is on the Worcestershire-Warwickshire border. Many Northwoods are traced in the introduction, but evidence is lacking with which to connect the owner of the manuscript with any of them. The rather ornate character of the colophon suggests that Northwood was the compiler of the collection.

That he was a compiler rather than author is evident not only from the fact that so many of the texts are known in other versions but that some of the texts show residual traces of dialects other than the West Midland. These appear, for example, in occasional spellings and imperfect sequences of rime words which can be corrected by restoring the presumed Northern forms of the original. The phonology, which is studied in full, is consistent with the presumption that the collection was put together at Bordesley Abbey and with the belief that the compiler's dialect was West Midland.

Each of the texts is discussed in relation to other known versions. Several texts which are also found in the Vernon MS. throw a new light on this famous manuscript. It has sometimes been held that the Vernon compiler "edited" his texts. It is here shown that the changes must have been made in a common ancestor of the Vernon and Bordesley manuscripts, since neither of the latter was derived from the other. The most interesting proof of this fact is in the text of the Body and Soul, where the dislocation of a

block of stanzas, not hitherto fully explained, is shown to result from the wrong folding of a leaf in a version at least two removes from the Vernon and Bordesley copies.

In addition to the introduction in which these and other matters are discussed the edition is provided with notes and a glossary. 162 pages. \$2.15. Mic 57-2825

THE ADVENT OF MODERNISM IN CANADIAN POETRY IN ENGLISH 1912-1940

(Publication No. 22,033)

Alexander Munro Beattie, Ph.D.
Columbia University, 1957

This study undertakes to show what effects the "new" poetry of England and the United States had upon poetic theory and practice in Canada. As a preliminary, modernism is defined in terms of its principal features; (1) experimental prosody, (2) colloquial and anti-"literary" diction, (3) realism of treatment, (4) contemporaneity of theme, (5) the use of symbol and myth as poetic methods, (6) the widening of the range of tones and attitudes available to the poet.

Canadian writers and reviewers in the nineteen-twenties were accessible to new ideas. National prosperity and a growing sense of national identity stimulated activity in education, the arts, and literature. In the field of letters, this produced at first a consolidation of achievements up to the present. Histories of Canadian literature, critical studies, anthologies, and editions of the works of the major poets of the late nineteenth and early twentieth century contributed to the work of consolidation during the first half of the decade. By 1925, the "Canadian Pantheon" had been established: Charles G. D. Roberts, Archibald Lampman, Bliss Carman, and Duncan Campbell Scott. Their poetry, examined in chapter four, exhibits, among many individual virtues, certain faults common to all late-Victorian poets. In the lesser versifiers these faults unmistakably betrayed the decrepitude of the romantic tradition.

During the period of consolidation in Canadian letters, interest in other possibilities for poetry was stirring. New directions in poetry were provided by writers outside of Canada. Knowledge of the modern movement was disseminated through the literary columns of Canadian newspapers and in articles in Canadian magazines. Evidence of this sort is somewhat thoroughly adduced in chapter five. The second stage in the advent of modernism in Canada was the appearance of several books of free verse. This experimental work--little of which was of any lasting value--is surveyed in chapter six.

Mere imitation of external form and style, however, missed the essence of modernism. Wholly new concepts of poetry had to be arrived at, as well as a wholly new understanding of the poet's relation to society. Persistent attacks on established ideas appeared in three "little" magazines: the Canadian Forum in Toronto, and the McGill Fortnightly Review and the Canadian Mercury in Montreal. In these two Montreal magazines appeared also poems by A. J. M. Smith, F. R. Scott, Leo Kennedy, and A. M. Klein. Modelling themselves after the Imagists, T. S. Eliot, and W. B. Yeats, they created the earliest examples of modernism in Canadian poetry. Three Toronto poets, as well,

displayed in diverse ways their power to move away from the old conventions and themes into new areas of sensibility and composition: E. J. Pratt, Dorothy Livesay, and Robert Finch. Upon the collapse of the two Montreal periodicals, the Canadian Forum carried forward to triumph the cause of the new poetry, through a series of articles revaluing the elder poets of Canada and calling attention to the exponents of modernism.

The thesis maintained in this study is that the indispensable qualities of modernism had been observed, discussed, and emulated in Canada by the close of the decade of the nineteen-twenties. The closing pages of the study, then, are epilogue to the central theme. It was necessary, however, to show that the new bearing taken by Canadian poetry in the twenties not only made possible a renovation of poetic theory and practice, but prepared the way for a period of poetic abundance and excellence. The thriving state of Canadian poetry in the forties and fifties is a sequel to the advent of modernism in the nineteen-twenties.

299 pages. \$3.85. Mic 57-2826

HERMANN HESSE, THE MAN AND HIS WORLD AS REVEALED IN HIS WORKS

(Publication No. 21,776)

John Wilson Brunner, Ph.D.
Columbia University, 1957

Hermann Hesse is an author who draws heavily upon his own personal experiences. Therefore, any really complete understanding of his work is impossible without reference to the life and world of the writer. The present study is an attempt to present a detailed portrait of the poet and his spiritual world as revealed in his works.

Throughout Hess's life three key themes continually recur: the problem of the artist, the search for one's self, and the transcendental unity behind the varied poles of existence. At times one theme seems to hold the center of his interests, at times another, but through the years we find them always reflected directly or indirectly in his writings.

In his earliest works we see Hesse as the young romantic, lost in fanciful reveries, in the intoxication of youthful idealism. Yet at other times he appears as the rational critic and cynical satirist. The aesthete then develops into a "seer of eternity," while his beauty cult becomes nature worship. Yet his rational self continues to dispel his dreams and reduces him to fatalistic pessimism. His maladjustment to life causes him to continue to take flight into fantasy and sublimation until finally a premonition of mystic illumination leads him to a life of quiet resignation devoted to pure contemplation. War shatters his calm idyll and demonstrates with soul-torturing vividness how abnormal and unhealthy the entire European social structure had become. Only through individual, intensive self-examination can European man hope to recover from his state of degeneration. Hesse leads the way as he feels the artist should. He plunges into the dark inner world of his drives seeking to come to an understanding of himself and the internal conflict which had always tormented him. Mere recognition of the natural laws, he finds, is not sufficient to overcome his deep-seated

guilt complex. He then turns to Asiatic philosophy, submerges himself in meditation and finally attains a genuine mystic experience. However, even this provides but temporary refuge. Finally, out of sheer desperation, he casts aside all reservations and devotes himself ardently to the world of sensual experiences. The release of his long pent-up inner drives provides another sort of mystic exultation. Thus, he learns to see both poles of existence, the spiritual and the sensual, as equally valid approaches to the absolute. Both the thinker and the artist have a significant contribution to make; each path can lead to ultimate peace in the absolute unity transcending the polarity of life. Hesse's final message is that man's first aim must be to come to an understanding of himself and then, by whatever path his nature requires, to devote himself to the service of mankind, whereby he fulfils his highest function. 330 pages. \$4.25. Mic 57-2827

LONDON IN ENGLISH LITERATURE, 1880-1955

(Publication No. 22,038)

Jeanne Gabriel Clark, Ph.D.
Columbia University, 1957

The purpose of this study is to demonstrate the role of London in English literature from 1880 to 1955. Before the investigation proper begins, a brief examination is made of the treatment of the city in classical literature where the city is found to be either an object of praise, as in the *encomium urbis*, or of denigration, as in Juvenal's *Third Satire*. This is followed by a brief consideration of the treatment of London in literature before 1880. During the sixteenth, seventeenth, and eighteenth centuries, many pamphlets, poems, and plays glorify London and Londoners. Dekker and Heywood in the early seventeenth century praise London citizens; Restoration plays at the end of the century glamorize upper-class life. Even the satires of the eighteenth century betray the writers' fascination with the city. The Romantic and Victorian poets during the nineteenth century, however, either ignore London or mention the city only to condemn it. A number of novelists during the late eighteenth and early nineteenth centuries treat fashionable London society, but in the middle of the nineteenth century there appears the slum novel. The major writer of this period is Dickens who, using London as both setting and symbol, gave new insights into the use of the city for fictional purposes.

In the eighties and nineties the slum was still a popular subject with writers. Under the combined influence of Dickens and Zola, writers reveal life in the East End as something close to animal existence. The only way in which an individual can avoid becoming brutalized is by escape from the slums, which the more sentimental writers of this period conveniently manage. Included in this study of slum literature are works by Gissing, Moore, Morrison, Maugham, Bennett and Orwell as well as works by the poets Symons and Davidson.

When writers shifted their setting to the West End, city surroundings appear to be more congenial. The attitude toward West End inhabitants varies considerably, however. Bennett, Walpole and Arlen are sympathetic and even adulatory; Wells and Galsworthy are critical, Huxley and

Waugh satirical; while such writers as Rose Macaulay and Firbank hold attitudes which combine sympathy, criticism and satire. In most of the London novels of these writers the city plays a prominent part as setting, background and atmosphere.

During the nineties the poets rediscovered London. Under the influence of Baudelaire and the impressionist painters, many found the city a thing of beauty which they interpreted, like Symons, in terms of artifice or, like Henley, in terms of impression. A few, Binyon at times and Lawrence always, for example, reacting unfavorably, found the city ugly and depressing.

The most complex treatment of London was made by the symbolists who, using the devices of analogy, metaphor, allusion, juxtaposition, and other symbolist techniques, give greater depth and breadth to the interpretation of the city in modern fiction. The city, in their hands, often achieves a position equal in importance to characters and plot. To Dorothy Richardson London represents life itself; to Virginia Woolf it is both life and death; to Conrad it becomes an outward representation of inward desolation and despair; to Eliot it is waste land and hell, and a proper abode for a sterile civilization. London to these and other symbolist writers is a focal point for observations on contemporary life; their description of the city becomes a commentary on this life. Because the city is a complex organism, it has proved itself to be a suitable expression of complex modern life. 309 pages. \$4.00. Mic 57-2828

A STUDY OF GRIM HUMOR IN THE WORKS OF POE, MELVILLE, AND TWAIN

(Publication No. 22,012)

Edward Francis Foster, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Richmond Croom Beatty

Grim humor may be defined as the mingling of the serious and the comic. It is part of the emotional pattern that underlies and connects such disparate aspects of life as tragedy and comedy, joy and sadness, the sublime and the ridiculous. The following types of grim humor may be noted: Anglo-Saxon understatement, German *Galgenhumor*, Scotch plain-spokenness, French surrealist *l'humour noir*, and the macabre and grotesque.

Numerous examples of grim humor may be found from the early Greeks to modern times. The dialogues of Lucian and the comedies of Aristophanes contain instances from antiquity. Anglo-Saxon poetry, medieval drama, and the Dance of Death motif furnished major strains during the Middle Ages. Elizabethan drama and prose also offer many fine examples. In the seventeenth and eighteenth centuries men such as Jonathan Swift and Robert Burns spiced their work with grim humor. During the Romantic period poets such as Southey, Praed, Hood, and Byron, and essayists such as Lamb and Dequincey employed it.

In Early America Puritanism, German romanticism, and frontier life contributed to the development of a native form of grim humor. From the Puritans came a psychic tension, from the Germans came the trappings of Gothicism, and from the frontier came a rude boisterous attitude that stressed a comic death consciousness.

Edgar Allan Poe was influenced principally by the European Gothic tradition. His grim humor is part of a satirical anti-romantic tendency that characterizes most of his comic material. The stock situations of Gothicism are burlesqued and expertly twisted to show the inanity of the less capable writers of that school.

Poe makes considerable use of the macabre, but his principal humoristic mode is that of the grotesque. The distortion and discontinuity of this method thoroughly permeates all his stories that deal with the serio-comic. In the development of American grim humor Poe represents a transitional stage between the declining force of Gothicism and the slowly emerging native comic spirit.

The purely American influence is more apparent in Herman Melville, though most of his major work deals with life at sea. The Folk Spirit and the expansive mood of mid-century inspires his laughter and always lurks in the background. His serio-comic material is extremely diverse, and covers a wide range of emotional significance.

Melville's grim humor relies upon suggestion and ambiguity for its power. He is interested in something beyond laughter itself, and he is constantly probing beneath the surface of human emotions in search of the "linked analogies" of life. Consequently his grim mirth has a universality and depth of meaning far beyond that to be found in Poe and Twain.

The thoroughly American grim humor of the frontier and the West comes to the fore in Mark Twain. His humoristic mode reflects the tastes and customs of those regions. It is a technique that employs plain-spokenness and avoids euphemism. Emphasis is placed upon unpleasant details. Death and discomfiture become prime materials for joking.

Twain's grim humor, as a rule, has little depth or thematic significance. It is mainly a surface play of horrible details, noisome imagery and, frequently, crude jesting. Schadenfreude, or laughter at calamity, is a sub-species of grim mirth that he employs fairly often. Twain mirrored the American taste for a wild sort of humor that satirized, debunked, and poked fun at many of the things which convention ordinarily respected.

310 pages. \$4.00. Mic 57-2829

HERMANN HESSE AND GOETHE WITH PARTICULAR REFERENCE TO THE RELATIONSHIP OF WILHELM MEISTER AND DAS GLASPERLENSPIEL

(Publication No. 21,791)

Inge D. Halpert, Ph.D.
Columbia University, 1957

The purpose of this study is to investigate Goethe's role in the life and works of Hermann Hesse, to describe in detail Hesse's attitude towards Goethe, to define Goethe's influence on him, and to trace the form that the Goethean tradition assumes in Hesse's world. In contrast to general (and often inaccurate) surveys of the Hesse-Goethe relationship I attempt to give a detailed study of that relationship based on an exhaustive survey of relevant materials. Instead of the usual loosely associative thematic treatment, I offer first a systematic chronological survey of "Hesse's experience of Goethe," and second, a detailed comparison

of Goethe's *Wilhelm Meisters Lehr- und Wanderjahre* and Hesse's *Das Glasperlenspiel* with special attention to their respective "pedagogic provinces." Since the *Glasperlenspiel* represents in many respects the culmination of Hesse's tireless self-exploration, its close examination offers unique insights into the final stage in his lifelong effort to come to terms with Goethe.

Hesse's relation to Goethe presents itself chronologically in three clearly differentiated stages: the first one, characterized by great adulation of and devotion to the master, extending approximately to the end of the first World War; the second, one of detachment from him, lasting about ten years; and the third, a period of acceptance, respect and appreciation, of a recognition of mutual affinity, of a desire for emulation, of striving to perpetuate the Goethean tradition. In the center of Hesse's interest there stands above all Goethe's personality, Goethe the man. Both an affinity and basic differences attract Hesse to Goethe the human being. He finds in the master throughout his life a source of strength and guidance.

In the second part of this thesis I concentrate my analysis on the general setting and background of the two selected works, on their ideological principles and pedagogic program, on their manner of characterization and, finally, on their form. I examine the often propounded, commonly accepted, yet never proven hypothesis that Hesse's *Glasperlenspiel* is the twentieth-century counterpart of Goethe's *Wanderjahre*. Although Goethe's "pedagogic province" was the source for Hesse's idea of Kastalien - as shown by the numerous external and internal similarities and by Hesse's explicit desire to erect the complete structure of a pedagogic province on the basis of Goethe's blue-prints - the message of the *Glasperlenspiel* proves to be the very opposite of that of the *Wanderjahre*. Completely rejecting the panacea of humanitarian socialism as expressed by Goethe in the *Wanderjahre*, Hesse acknowledges the ethical humanism of the *Lehrjahre*. He presents his *Glasperlenspiel* as an "anti-*Wanderjahre* Meister" and thus as a much more appropriate sequel to the *Lehrjahre* than Goethe himself had provided. The antithesis implied by the names of the two heroes of Goethe's and Hesse's novels is corroborated by their different characters. With respect to form, the two works, as *Alterswerke*, have a great deal in common. Despite its numerous differences, Kastalien proves to be, nevertheless, permeated with a truly Goethean spirit. To this spirit, Hesse has, as I attempt to prove, paid special tribute in the figure of the Alt-Musikmeister.

The detailed analysis establishes Hesse's ability to assimilate and to utilize the Goethean tradition as a living force. Goethe's themes and problems are shown to reappear in Hesse's work in an intensified, a more daemonic form, carried in a most modern fashion to their psychological depths. Hesse makes an impressive attempt to preserve the past by combining it with the present.

273 pages. \$3.55. Mic 57-2830

THE EIGHTEENTH CENTURY ALLEGORICAL ESSAY

(Publication No. 21,793)

Edwin Christian Heinle, Ph.D.
Columbia University, 1957

During the eighteenth century the allegorical essay was one of the most popular kinds of writing which appeared in the periodicals; and important contributors--Addison, Steele, Swift, Johnson, Goldsmith--wrote in the genre at one time or another. The purpose of this study is to examine influences that appealed to the eighteenth century reader and to show the relationship of these essays to the intellectual climate in which they flourished.

The eighteenth century writer believed that he was reviving allegory as it had been written in classical times. Then, at its best, it had been clear and uncomplicated. However, during the Middle Ages it had become obscure and cluttered with bewildering details, while in the Renaissance, despite the renewed interest in classical literature, allegorical writing had continued to be presented in the medieval style. In the pictorial arts likewise, allegory had suffered under the influence of the complicated system of Renaissance hieroglyphics and emblems. By the eighteenth century, however, the neo-classical demands for simplicity and clarity were being made both in literature and in painting. Now, critics like Shaftesbury and Addison were urging the artist and writer to return to the simple allegorical representations of ancient statues and coins.

Two short classical allegories, the Choice of Hercules and the Table of Cebes, were considered perfect models by eighteenth century critics. Rediscovered during the Renaissance and used widely as school texts, they were by this time familiar to every educated person. The allegorical pattern of these works shows man faced with a choice between Virtue and Vice, personified as two ladies who offer the traveller two different paths, one difficult but rewarding, the other easy but sinful. For the painer this "choice theme" soon became a commonplace, as Erwin Panofsky has shown in Hercules am Scheidewege (1930), while in literature the theme had its fullest influence in the allegorical essays of the periodicals. Here allegory was expressed generally through four basic scenes that derive from the classical models. The first and simplest of these visual patterns focuses upon the two women, who represent various good and wicked ideas. In the second general pattern the attention turns to the two paths and to the landscape through which they lead. In other essays the allegory is expressed through the figure of a mountain. Finally, many essays describe a procession at the court of an allegorical goddess, a kind of scene that is prominent in Cebes.

Most of the essays were written as dream allegories: the scenes are observed by a dreamer as he sleeps. Investigation of contemporary theories of dreaming shows that this dream-framework was a suitable convention because actual dreams and literary dreams were believed to have much in common. In fact, the two were often confused and discussed in the same terms, so that actual dreams were frequently considered a kind of natural allegory that conveyed moral lessons to a man at night. Like literary dreams, they were works of art composed for the instruction of the dreamer, and, just as a man could be influenced by literary allegories, so could he be influenced by his dreams. For the general reader of the time the

purpose of both was the same, and so the use of the dream-framework must have seemed especially appropriate for the allegorical essay in the eighteenth century.

243 pages. \$3.15. Mic 57-2831

A CRITICAL ANALYSIS OF THE DISLOCATED CHARACTER AS DEVELOPED IN THE MAJOR NOVELS OF HENRY JAMES

(Publication No. 21,854)

Alice Evangeline Johnson, Ph.D.
The University of Wisconsin, 1957

Supervisor: Associate Professor John Enck

This thesis analyses the development of Henry James's social vision as seen through his treatment of dislocated characters. By examining, chronologically, the major novels, it becomes evident that the theme of dislocation was an important element in shaping the kinds of novels he progressively wrote and that his early concern over the commitment of the United States to materialistic values gradually broadened until the vision came to include Western civilization.

Chapter I considers factors in nineteenth-century America conducive to the phenomenon of dislocation and James's use of this phenomenon for narrative purposes. That James interested himself in the frequently unhappy consequences of the shifting social pattern illustrates his private decision to be a critic as well as an artistic portrayer of his period.

Chapters II, III, IV, and V provide detailed analyses of the various kinds of dislocation which are thematic in the novels. James moves from physical displacement to intellectual displacement to ethical, moral displacement. The view of the American as morally dislocated is gradually supplanted by a belief that dislocation is symptomatic of a destructive illness besetting Western civilization.

During the 'seventies, James focussed on the most obviously dislocated American culture-seekers: the artist; the business-man; the expatriate. Nearly all characters studied in Roderick Hudson, The American, and The Europeans failed to find an ideal world. The three novels which followed, in the 'eighties, reveal the end of his writing apprenticeship, the beginning of awareness of the universality of dislocation, and a growing preoccupation with style. The Portrait of a Lady marks the turning point of worship of the British upper class, henceforth to be viewed more critically. In The Bostonians and The Princess Casamassima, such characters as Olive Chancellor and Lady Aurora demonstrate that while outsiders may strain for acceptance in an elite group, the "ins" are not necessarily psychologically secure. Their discontent is as painful as that of the outsiders. In The Princess Casamassima, in particular, there is evidence that James considers European society to be decaying; subversive stirrings among the lower orders describe a dissatisfaction with the status quo.

During the 'nineties, James wrote scathingly of British society. In such experimental novels as The Tragic Muse, What Maisie Knew, and The Awkward Age, he probed beneath the surface of the English social facade. Money

appeared to be the chief preoccupation of the upper class; compromise with honor was accepted as normal; morality was non-existent; adultery flourished openly; children were exploited, even destroyed, by selfish parents; manners were all that mattered.

The last novels, *The Ambassadors*, *The Wings of the Dove*, and *The Golden Bowl* mark a return to a concentrated study of a few individuals. In each work, money is a prime motivator. The dislocated characters depicted, as much the victims as the creators of shifting social standards, are frequently involved in complexities for which the world provides no rules. In an effort to understand and resolve the problems which they face, they sometimes err, for there is no clear-cut code to guide them.

From the above analysis the following conclusions can be made: by examining the novels from this point of view, it is possible to illuminate some of the facets of James's maturing artistry--his choice of themes, his intent in characterization, and the irony which increasingly became a powerful element in his craftsmanship: by concentrating on the single theme of dislocation, it is possible to trace James's concern with the loss of moral values, with materialism as the chief corrupter, and with the increasing confusion of money and morality--a confusion of values which was rapidly becoming an accepted condition in modern society.

332 pages. \$4.25. Mic 57-2832

JOSEPH CONRAD: A MODERN VICTORIAN (A STUDY IN NOVELISTIC TECHNIQUE)

(Publication No. 21,797)

Frederick Robert Karl, Ph.D.
Columbia University, 1957

The writer seeks to show that Conrad's experiments with the form of the novel demonstrate a break from the leading Victorian novelists. However, Conrad's experiments with interrupted speech, with time shifts, with scene and character doubling, and with sub-surface rhythms, were not innovations in the genre; his devices were traditional. But he was unique in that he used all means at hand to remedy the episodic formlessness and sentimentality of the typical Victorian novel. In trying to evolve a new type of novel, Conrad was anti-realistic, anti-naturalistic, and anti-romantic. In his Preface to *The Nigger of the Narcissus* and in his early letters, he developed an aesthetic position in which artistic perfection transcended any single formula.

Conrad was indebted to Flaubert, Maupassant, and James for their unswerving fidelity of purpose. In his trying "to make you see," he was following in the steps of the same authors, with their precision of expression, their pictorial qualities, and their impersonal narratives. Applied to his fiction, Conrad's literary ideas gave his work a variety and depth that place him, technically, with Joyce, Woolf, Faulkner, and Gide. In other ways -- in his political views, in his personal philosophy, and in his use of traditional novelistic techniques -- Conrad remained, nevertheless, a man of the nineteenth century.

His early novels, from *Almayer's Folly* through *The Nigger of the Narcissus*, show a continued reliance on the form of the Flaubertian novel. But beginning with *Lord*

Jim, Conrad's experiments with the structure of the novel looked ahead to his rich middle period. *Nostromo*, the most important of his major novels, heralded his literary maturity. The writer's examination of all versions of *Nostromo* -- from MS and TS through the Collected Edition -- indicates Conrad's insistence on the exact word and the exact effect and shows that his conception of the novel, its expanded ending for the first edition notwithstanding, was sure from its first stages. Moving from his early exotic settings, Conrad used city images in *The Secret Agent* and *Under Western Eyes* to convey his themes of greed, chaos, and individual isolation. In *Chance*, however, he allowed an intricate narrative technique to overwhelm an essentially simple domestic situation. *Victory*, published on the eve of the first world war, was his last major novel and summed up his dominant themes in the conflict between Jones, whose acts are motivated by a sick mind, and Heyst, who is unable to act. In the final ten years of his life, Conrad's fiction steadily declined in quality as he returned wearily to the techniques and themes of his early work.

The conclusion is that Conrad needed an extensive technical apparatus to gain aesthetic distance. His use of Marlow and other narrators, together with his reliance upon symbols, time shifts, character doubles, and recurring situations, was his way of achieving impersonality. When he forsook elaborate technique in his fiction after *Victory*, his work is thin and unconvincing. But in his major work -- *Nostromo*, *Victory*, *The Secret Agent*, *Under Western Eyes*, "Heart of Darkness," and "Il Conde" -- he combined imaginatively several technical devices to weave a rich fabric of a world caught in chaos. His aim was always artistic excellence; philosophic or political significance was secondary. In his emphasis on perfection of form, on the omniscient but impersonal author, and on the structure of the whole, Conrad belongs with the major twentieth-century novelists.

456 pages. \$5.80. Mic 57-2833

EDMOND JALOUX AND HIS LITERARY CRITICISM

(Publication No. 21,798)

Jack Kolbert, Ph.D.
Columbia University, 1957

Although Jaloux was one of the most prolific and leading French literary critics of this century, no one has as yet undertaken a large-scale, comprehensive study of his criticism.

The work is divided into three parts: first, a portrait of Jaloux's biography, personality, and character in so much as these are reflected in his criticism; second, an investigation into his notions on the nature of criticism, the method he pursued, and his criteria; finally, an overall study of Jaloux's work in three areas, the contemporary French, the traditional French, and the foreign authors.

Jaloux's life and his literary ventures were synonymous. He was born in Marseilles in 1878 and died in Lausanne in 1949, with most of his years spent in the hub of Paris' literary and artistic activities. A regular contributor to numerous periodicals, Jaloux is remembered mainly for his long career as literary critic of *Les Nouvelles*

Littéraires and as chroniqueur of *Le Temps*. He was elected to the Académie française in 1936.

An author of at least four thousand articles and more than a dozen volumes of criticism, his multifarious and unsystematic nature sometimes makes it difficult to arrive at an overall, systematic comprehension of his critical procedures. At times, Jaloux's criticism is erudite and historical; at other times, it is little more than journalistic; occasionally too he appears as a critic whose insight derives from his fecund experience as a novelist. Charting a middle course between impressionism and dogmatism, Jaloux was ever mindful of the subjective and relative nature of literary judgment, while at the same time he averred that one could learn many durable lessons from the critics of the past. Essentially an independent and nonconformist in his views, he insisted that criticism be permanently divorced from political, religious, and other non-literary considerations.

Jaloux's method was usually divided into two interlocking analyses: the study of the genetic factors (biographical, psychological, sociological, historical) related to the creation of a given text, and also the study of the text itself. His conclusions included evaluations of books and an attempt to classify them in the broad literary tradition.

The criteria which guided him in his appraisals include his preference for works which were well written, which had the power actively to draw the reader into their web of life, which irresistibly induced the reader to escape from the pedestrian existence of his real life, which could transmit some sense of poetic pleasure (even in novels), and which were so rich, so maturely conceived, and so "dense" that one never tired of them.

A liberal, generous, and sympathetic critic, Jaloux was outstanding for his hospitality to the earliest literary manifestations of young authors. He played a useful role in contributing to the public acceptance of some of the leading French writers of his lifetime: Gide, Valéry, the surrealists, Fargue, Milosz, Mauriac, Maurois, Green, Sartre, Montherlant, Cassou, Lacretelle, and others.

Jaloux was also widely recognized as an eminent authority of foreign literature. His publications include essays on every period of English and German literature. He was particularly successful in his efforts to promote the appreciation in France of British romantic poetry, the Victorian novelists, Poe, and the twentieth-century authors, Virginia Woolf, Katherine Mansfield, Baring, Huxley, Joyce and others. In addition to his lifelong campaign to win approval for the German romantic tradition, he was indefatigable in his attempt to promulgate appreciation among the French of contemporary German writers. Jaloux has also studied Russian, Italian, Spanish, and Scandinavian literature.

With the writers of the French past, he was an ardent defender of romantic and imaginative literature in an era which he believed to be excessively tainted with cynicism and materialism.

316 pages. \$4.05. Mic 57-2834

ASPECTS OF KLOPSTOCK'S SENTIMENTALITY

(Publication No. 21,856)

Sven Verner Langsjoen, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Walter Gausewitz

This study of Klopstock's poetry was undertaken on the premise that Sentimentality as a concept in reference to a phase of eighteenth century German culture could profit by sharper delineation through re-examination and analysis of the literature of the time as documentary evidence.

The Introduction is devoted primarily to a review of the existing conception of the essence of Sentimentality. The review is given in terms of five aspects of Sentimentality: psychological orientation, social pessimism, attitude toward nature, the emotions, and the moral aspect. No irreconcilable views were found. But an almost exclusive emphasis on the tearful emotional aspect and a marked lack of clarity in the representation of the moral aspect were observed.

Proceeding from the latter observation, the subsequent analysis of the poetic expression of Klopstock's Sentimentality gives prior consideration to its moral aspect. In this analysis, which is oriented toward general clarification and coherence, the corroboration of existing views assumes a position of importance equal to that of the elaboration of hitherto overlooked or insufficiently stressed facts.

The following summary of results and conclusions will also integrate corroborated views with original findings.

First of all, it is established in detail that Klopstock's Sentimentality is basically a moral-emotional phenomenon. It is rooted in the conscious association of virtue with love and related tender emotions and vice with hate and violent emotions in general.

Social pessimism is manifested most clearly in Klopstock's conception of the "noble few" and in the poetic portrayal of their behavior pattern.

Klopstock's sentimental interest is focused primarily on man and morality; his interest in nature is of secondary significance. Thus none of his odes represents nature exclusively in and for itself. A study of Klopstock's conception of nature, his illustrative nature metaphors, and his personification of nature yields the conclusion that the various forms of Klopstock's poetic representation of nature are generally not Sentimental.

It is also shown that Klopstock's Sentimentality exhibits a joyful aspect equal in prominence to its tearful counterpart.

Among the facts which contribute detail to the above picture are the following:

1. In Klopstock's poetry friendship is an equivalent of spiritual love, the central emotion in Klopstock's system of tender, virtuous sentiments.
2. Two aspects of solitude appear as basic signs of Klopstock's Sentimentality. In addition to spiritual solitude, a virtuous emotion, there is the aspect of joyful physical solitude characterized chiefly by virtuous anticipation.
3. Anticipation and melancholy longing predominate over reminiscence and elegiac lament; together the

former attest to the pronounced orientation in the future of Klopstock's Sentimentality.

4. Meeting and parting are the main situational motifs in the *Messias*.
5. Klopstock's representation of personal beauty is restricted to two mobile facial expressions: the smile and the expression of the eye.

Concerned with basic aspects of Sentimentality, the study as a whole suggests that further scrutiny of Eighteenth century German Sentimental literature in general would prove rewarding. 140 pages. \$2.00. Mic 57-2835

GERTRUDE'S WEB: A STUDY OF GERTRUDE STEIN'S LITERARY RELATIONSHIPS

(Publication No. 21,613)

Frederick W. Lowe Jr., Ph.D.
Columbia University, 1957

This study examines the relationship between Gertrude Stein's salon and her effect, as a writer and *salonnière*, on Americans who joined her circle. The salon, at 27 rue de Fleurus, Paris, served throughout her career as a rallying point or a symbol for the *avant garde* of American literature. Its changes reflect, as a microcosm, the changing characteristics of the American expatriate movement.

Beginning as a forum for the proselytizing of Leo Stein in behalf of "modernist" painting, the salon continued in the "modernist" direction when it became more literary, under Gertrude Stein's leadership.

Before the first world war it assumed a bohemian cast in the eyes of such men as Donald Evans and Sherwood Anderson. Immediately after the war it became a focus for the "lost generation" of experimental writers such as Robert Coates and Ernest Hemingway. The years 1925 to 1930 reflected the decline in originality and intensity of the expatriate movement in some of the most important members, at that time, of the salon, such as Elliot Paul and Bravig Imbs.

The thirties, which saw Gertrude Stein become a world figure, introduced several new groups to her salon; world figures such as Clare Boothe Luce; writers from a more popular tradition, such as Alexander Woolcott; beginning writers seeking patronage instead of aesthetic stimulation, such as Samuel Steward and Wendell Wilcox; and academic men seeking to record Gertrude Stein's career rather than imitate it.

The few years after the second world war during which Miss Stein survived to lead her salon were tourist years, and mainly GI years. Consequently there are few concrete results of her effect on this new group to measure against her influence in earlier years.

But while her own work and the nature of her salon changed with the years, her direct literary influence is largely the result of her early work. Hemingway seems to have learned most, in 1924, from copying the manuscript of *The Making of Americans*, written ten to fifteen years earlier. Even Richard Wright, in 1945, found most significant for his own work her *Three Lives*, written more than thirty-five years before. Gertrude Stein's contribution by

this direct means was a step in the creation of the style now called, generically, by Hemingway's name. That style became the major form in which prose fiction was written for an appreciable period of our century.

The various stages of Gertrude Stein's more purely abstract and experimental work, which seems to have had almost no effect on later American writers, must be considered in terms of its general, tonic effect. The superficial imitations of her later styles which so many of her followers practised briefly and then dropped, can be looked upon as rituals of a cleansing nature. They symbolized for these writers a casting-off of past traditions, a freeing from stereotypes of all sorts, particularly in connection with words and their literary patterns.

Gertrude Stein's role, then, and the stimulation of her salon, might be compared to the theoretical scientist and his laboratory, in which experiments were conducted leading to the logical ends of a postulate, not to practical use through modification of an accepted theory. Though one seldom sees a popular literary product in the form of Gertrude Stein's experimental writings, the marketplace is crowded with works inconceivable in their present form but for the "incomprehensible" work of Gertrude Stein.

369 pages. \$4.75. Mic 57-2836

ORTEGA AND SPAIN

(Publication No. 21,805)

Constance Shaw Mazlish, Ph.D.
Columbia University, 1957

Starting with one of Ortega's basic philosophical tenets, that human life is a constant interplay between the individual and his circumstance, I have attempted, in this study, to show how much Ortega and Spain belong together. It was a question of Ortega's so shaping Spain that he could be true to himself and of molding his destiny so that it would be a service to Spain.

Ortega was aware that his view of Spain depended on his own way of being. When he was young and, above all an intellectual (a rather Idealist one), his reaction was almost completely unsympathetic. Materialism, or the insistence on matter and instincts, and personalism seemed to penetrate all phases of Spanish life, which was, he felt, closer to barbarism than to culture. During this period, individualism, mysticism, realism, and Unamuno-ism had a purely pejorative value.

The dissertation continues with Ortega's interpretation of the reasons for the intellectual shortcomings of Spain, such as her impressionist ethos and the substitution of formalism for pragmatic thought during the seventeenth century. Ortega's contribution to the intellectual life of Spain is emphasized, and an attempt is made to understand the ambiguity of his being a philosopher-poet, relating it to the Spanish circumstance and to his own destiny.

Closely connected with the intellectual problem is the absence, failure, or rejection of the minority in Spain. Caused, among other reasons, by the disappearance, in the seventeenth century, of a sustaining belief and a plan of action and by the renowned democratic Spanish spirit, the character of minority and majority in Spain influences all areas of national existence. There is an examination

of how this situation affected Ortega as a Spaniard and of the "popular" character of Spanish culture, together with a commentary on the extraordinary quality of the common people in Spain. Ortega believed that all cultural manifestations reflect individuals and their temperamental attitude toward life. A discussion of the emotional way of being of Spaniards--for Ortega, negative, crude, and limited--follows.

In a chapter on his opinions about literature and painting, the ennobling, poetic realism found in Spain's superior creations is given especial attention, and the artistic genius of Spain is reaffirmed.

The following two chapters treat Ortega's role in politics, along with the explanation of why he was compelled to play one, and his ideas about government; his analysis of the disintegration of his country and the plan for a new Spain in which all Spaniards would be vitally engaged.

Living always at the height of European culture, Ortega maintained, almost from the beginning, that Spain had to remain her peculiar self within Europe. With an ever-increasing questioning of modern European culture, by the thirties he decided that the Spanish problem was, to a large extent, a Western one. In his exposition and solution of this larger problem, the similarities with Spain are many. Moreover, Ortega, whose concern with human values continually increased, came to believe that Spain has something to give to the rest of Europe--especially, individualism and, perhaps, a closer proximity to the essentials of human living. How Ortega's very philosophy, offering a new belief for the Western world, includes, in its synthesis, the Spanish ethos is a final consideration.

304 pages. \$3.90. Mic 57-2837

AN ANALYSIS OF JOHN DOS PASSOS' U.S.A.

(Publication No. 21,977)

F. William Nelson, Ph.D.
The University of Oklahoma, 1957

Major Professor: Victor A. Elconin

The purpose of this study was to analyze the experimental devices and techniques employed in John Dos Passos' novel U.S.A. Of particular concern was the problem of significant form, i.e., the determination of the relationship of the technical devices to the themes of the novel.

A survey of the criticism of the trilogy was undertaken for the purpose of examining previous ideas concerning its structure. The intellectual climate of the time of writing, which included the idea of the "collective novel" as well as psychological theories of "behaviorism," helps to explain the techniques of U.S.A.; on the other hand, the specifically Marxist application of the concept of the collective novel would appear to have little relevance to the structure of Dos Passos' work.

The four major devices of the novel--The Camera Eye, The Newsreels, The Biographies, and The Narratives--were examined not only for their inner construction but for their bearing on the total structure of the novel. The theories of Sergei Eisenstein concerning film montage were made the basis of the examination of the Camera Eye and Newsreel sections. Dos Passos' Biographies were

carefully checked against more conventional studies in order to determine the extent to which his departures from literal truth furnish clues to his larger intention in U.S.A.

The Narrative sections of the novel describe the lives of twelve major characters, all of whom interact within the precincts of the novel. The actions of these characters are presented in stimulus-response patterns and there is little attempt at introspective analysis. Characters are presented largely by their own words in a method resembling indirect discourse. The effect of this presentation is to emphasize their involvement in society rather than their personal choices. The approach to character study is environmental and behavioristic.

In U.S.A., Dos Passos has represented the varied "voices" of twentieth century America. The narrative sections are built on the rhythms of characteristic American speech. The voices of the radio, the newspaper, the advertisement, and the politician appear in the Biographies and the Newsreels. The more sensitive voice of a contemporary poet appears in the Camera Eye. The interrupted narrative interspersed with the other devices provides for the presentation of the "voices" by a technique of discontinuity.

The major theme of U.S.A. is the disintegration of American culture in the twentieth century under the impact of industrialism. The devices and techniques of the novel provide for the dramatic presentation of the theme with a minimum of author intrusion. While Dos Passos is not uniformly successful in the execution of his plan, he does present a powerful picture of the collapse of a democratic culture.

255 pages. \$3.30. Mic 57-2838

JONATHAN SWIFT'S ATTITUDE TOWARD WOMEN

(Publication No. 21,817)

Katharine Munzer Rogers, Ph.D.
Columbia University, 1957

This dissertation, an analysis of the attitude toward women shown in Jonathan Swift's life and works, emphasizes the apparent contradictions in this attitude. Throughout his life, Swift enjoyed female society, and seemed also to require an intimate woman friend -- Stella, Vanessa, or Lady Acheson. Yet he appears always to have guarded himself against sexual involvement with women. Stella, for example, was very dear to him; but he maintained extreme caution in their relationship and insisted that his feeling for her was no more than "violent friendship." Although the endearments in the Journal to Stella strongly suggest the language of love letters, they were consistently expressed in babytalk, as if to a child, and were addressed not solely to her, but also to Mrs. Dingley.

There is a similar paradox in Swift's writings about women: he had, for his period, exceptional respect for their capacities and concern for their development, but at the same time attacked them with conspicuous bitterness. Some of these attacks are conventional, dealing with such traditional themes as chatter and overpreoccupation with dress; and typically they show the emphasis on good sense characteristic of the eighteenth century, criticizing the first failing because it reveals empty-headedness and the second because it diverts attention from worthier pursuits.

Even Swift's conventional attacks, however, are exceptionally virulent for his period. Nonetheless, unlike his predecessors in misogynistic satire, he seemed to consider women potentially equal to men and devoted much effort to developing this potentiality.

Apart from these campaigns against women's specific failings, there is a more significant one — against their bodies and all the functions they share with the lower animals. Earlier misogynists had disparaged female beauty and reviled sex, but Swift's attacks are distinguished from theirs by literal, realistic detail, suggesting that the female body is physically nauseating, and by emphasis on scatology. The frequency and unnecessary detail of Swift's descriptions suggest that he enjoyed showing women engaged in unattractive natural functions, but of course he often used this fact to symbolize the falsity of idealizing them. Consistently, he ridiculed romantic love and idealization: to fall in love, for example, is expressed as to "sell your self to Laughter." ("Strephon and Chloe") Apparently he recognized only two possible relationships between the sexes — gross lust or rational, desexualized friendship. On the rare occasions that sexual encounters are mentioned in Swift's works, they are represented as horrifying. Besides repudiating woman as a sexual object, Swift disparaged her as a mother: his references to mothers usually assume them to be neglectful or foolish, and his descriptions of motherhood, as in the Yahoos, are usually unattractive. He seldom showed any awareness of emotional ties within the family.

Swift's attitude toward women — a combination of approach and avoidance in his life and of admiration and deflation, defense and attack in his works — may best be characterized as ambivalent. To explain this ambivalence one must, I believe, turn to psychoanalytic theory. Swift's behavior fits well into the pattern which Freud described as the split in male love life, a conflict between tenderness and sensuality which makes it impossible for a man to desire the same woman he loves and which may lead to a total rejection of sex. This can be traced to repressed hostility against women, which might well have resulted from a feeling of rejection during childhood, such as Swift appears to have had, together with the necessary dependence upon women of a fatherless child. This condition could have led Swift to accept woman as a companion, but repudiate her as a mate. 259 pages. \$3.35. Mic 57-2839

ANDRÉ SUARÈS, CRITIQUE

(Publication No. 21,823)

Gabrielle Savet, Ph.D.
Columbia University, 1957

This dissertation examines and evaluates André Suarès as a critic. It disregards his other work: poems, dramas, philosophical essays and aphorisms. Indeed, it appears to this author that Suarès's critical writing is his major contribution to literature. It includes essays on writers, painters, musicians; yet the personal approach makes it homogeneous.

The literary portrait is Suarès's form of expression. The life of his "model" merely serves as a frame within which he analyzes artistic activity, unveiling the artist's

personality in the light of his work. Suarès compares critical creativeness to the writing of a novel or drama. In due time interaction develops and characters emerge, including that of the critic himself: for any portrait, especially that of an artist, should reflect the personality of the portraitist and introduce his own views on art and the human condition.

The two main divisions of this dissertation are "Doctrine" and "Critical Activity". The first chapter deals with Suarès's own portrait. It is based on biographical data and developed from statements found in his writings, which though often of a contradictory nature, nevertheless are used to throw light on his personality. Whether one accepts Suarès's susceptibility, his irascible character, or becomes irritated by the posture of a solitary giant of letters, the fact remains that essentially he is a humanist. To Suarès art is the highest expression of morality -- and as important as religion. Only a few exceptional artists achieved what art has to offer to mankind: those are the "tragic poets" such as Shakespeare, Dostoevski, Rembrandt. Suarès cannot divorce himself from them -- they are the "gods" who nourished and molded him.

The second part of this study, devoted to Suarès's critical activity, is divided into three chapters: on literature, the visual arts and music.

"Criticism" as understood by him, consists as a rule of analyzing the merits and beauty of a work. Infrequently, though, he fulminates against the unreserved admiration offered a writer like Victor Hugo. Whatever the case, he is eminently able to follow the artist from his early surroundings to his mature phase through a combination of two deep-rooted propensities: sensuality and abstraction. He likes to combine physical and moral traits, and thus achieve a synthesis.

In the chapter on literature the large portraits are discussed: Ibsen, Shakespeare, Cervantes, Tolstoy, Dostoevski; also smaller ones of Stendhal, Beaudelaire, Villon, Verlaine, etc. A subdivision of this chapter introduces various artists whose figures Suarès had merely sketched.

Le Voyage de Condottiere offers Suarès's impressions gathered in Italy. It is an original work in the way his personality is continuously blended with the impressions created by cities, monuments, paintings. This is a highly impressionistic book from beginning to end.

The last chapter, on music, deals mainly with Suarès's articles on Wagner and Beethoven, and his study of Debussy.

Suarès's work reveals his love for beauty, a taste unhampered by the limitations that beset the conventional critic, and the artistic gift of expression. He rightly called himself a knight in the service of beauty.

263 pages. \$3.40. Mic 57-2840

THE SYMBOLIST POETICS IN THE MERCURE DE FRANCE (1890-1905)

(Publication No. 21,825)

Aviva H. Schonthal, Ph.D.
Columbia University, 1957

One of the most respectable organs of symbolist writers was the sedate *Mercure de France*, run by conservative

Alfred Vallette. Besides expounding and upholding the new movement in its pages, the publication established its own publishing house in 1894 which became an outlet for symbolist books. This step gave many struggling writers an opportunity to get their work into print. At the same time, by solving the publication problems of its regular contributors, the review strengthened their literary status.

Although the guiding principles of the *Mercure de France* excluded the reign of any literary creed at any time, it soon became apparent that, in spite of their intention to remain open-minded, most of the periodical's founders were affiliated with symbolism in some way, and that the majority of contributors belonged to this school. This was natural, since the review's founding date (1890), coincided with the apogee of the movement. While it welcomed all worthy contributions, the *Mercure* remained under symbolist domination until 1905.

Its tolerant editorial policy, based on a desire to be broad-minded and eclectic in its choice of material, allowed collaborators total individual freedom, and encouraged their spontaneous expression of subjective convictions. This approach attracted talented writers whose cooperation might otherwise have been lost.

A large part of the *Mercure's* contents pertained to symbolism and represented the range of opinions and the conflicts within that group. The periodical actually fortified the movement by serving as a forum in which differences could be ironed out and the symbolist credo could be shaped, refined, and presented to the public. Remy de Gourmont, who became the official advocate of this doctrine, and the most important critic of the works that it inspired, was a power on the staff of the review.

In its desire to be conscientious and thorough, the publication devoted attention to foreign literary currents and to the arts. Developments in Belgium, Scandinavia, England, Germany, the Slavic countries, Italy, Iberia, North and Latin America were regularly noted. Regular art chronicles reported the latest news about painting and sculpture. The impressionists were reviewed sympathetically by the *Mercure's* columnists. The music critics showed an equal preoccupation with and partisanship for contemporary trends. Wagner and Debussy were devoutly admired.

One of the most vital and controversial sections, the "Revue du Mois," contained book reviews written by adherents and opponents of symbolism. The criticisms were not restricted to the products of the movement, but covered the entire field of contemporary literature. They were uninhibited expressions of opinion which the editorial board did not censor. The periodical also carried rebuttals by authors who were dissatisfied with the evaluations they had received from the *Mercure's* collaborators. Some lively literary feuds developed in this way.

Occasionally the "Journaux et Revues" column reprinted articles hostile to symbolism that had appeared in the press at large. However, original contributions from critics like Doumic, Faguet, et al. were not accepted, for their viewpoint was not in harmony with the policy of the publication. Hence they did not have a chance to defend themselves against the often merciless treatment they received at the hands of the *Mercure* group.

Thus, while the *Mercure de France* largely succeeded in remaining true to its initial "raison d'être," an impartial, eclectic, and tolerant editorial policy, it also

strengthened the symbolist cause and acted as the latter's publicity agent. 426 pages. \$5.45. Mic 57-2841

THE OCCULT IN NINETEENTH-CENTURY SYMBOLIST LITERATURE

(Publication No. 21,619)

John Senior, Ph.D.
Columbia University, 1957

This thesis is an exploration of the relation of occultism to the symbolist movement in nineteenth-century French and English literature. The meaning of the term "occultism" is first considered critically by brief discussions of the anthropological, sociological, and psychological views of Tyler, Frazer, Spencer, Müller, Durkheim, Freud, Malinowski, Cassirer, and the "Cambridge" school. The thesis then proceeds inductively to brief discussions of the occult world-view as it appears in Babylonian and Egyptian mythology, Hindu thought, Plato, the *Corpus Hermeticum*, the *Cabala*, astrology and alchemy, and the various occult sects since the Renaissance -- Rosicrucian, Swedenborgian, Martinist, Theosophist. From this survey, the essential principles of an occultist "credo" are listed as a working definition of the word "occult" as it is used in this study.

The greater part of the thesis is an examination of the work of six symbolist poets: Gérard de Nerval, Baudelaire, Rimbaud, Mallarmé, Villiers de l'Isle-Adam, and Yeats. As an introduction to the subject, Huysmans is studied as a paradigm of the occult-symbolist, and, since the symbolist movement is taken to be a particular manifestation of the larger movement of romanticism, Blake and Hugo are considered in order to demonstrate the importance of occultism to romanticism.

From a detailed study of *Les Chimères* and *Aurélia*, the world-view of Nerval is outlined and identified with occultism. Nerval describes his psychological voyage during the two mental crises he suffered, as a "descent into Hell," and this descent is shown to be related to the occult symbolism of the "way down", as the Hermetics called it -- that is, the descent is identified with the "way" to vision and the ultimate realization that all things are aspects of a single reality.

An analysis of the work of Baudelaire and Rimbaud reveals an essentially similar symbolism; *Les Fleurs du Mal* and *Les Illuminations* and *Une Saison en Enfer* are considered according to the metaphor of "descent" also.

Two works of Villiers are discussed: *Claire Lenoir*, which demonstrates Villiers' interest in occultism, and *Axël*, in which the more profound symbolism of the occult world-view occurs.

The more difficult work of Mallarmé is discussed chiefly through Mallarmé's own statements of his intentions in his letters and criticism; then a few of the poems and a longer, unfinished prose work, *Igitur*, are studied as examples of the way in which these intentions were carried out.

The thesis ends with a detailed discussion of the life and work of Yeats. Yeats's connections with occult societies of his day are demonstrated, his own works on occult

subjects are discussed, and his major poems are analyzed in an attempt to show how their central meanings are related to his essentially occult world-view.

This thesis is meant to be exploratory rather than definitive, and its final contentions are therefore tentative. They are these: 1) that symbolist poets had direct connections with specifically occult movements, in their reading and often in personal experience, and 2) that the world-view behind the symbolist movement as a whole is essentially occult. 275 pages. \$3.55. Mic 57-2842

THE JAPANESE PROLETARIAN LITERARY MOVEMENT, THEORY AND FICTION: 1921-1934

(Publication No. 21,673)

George Tyson Shea, Ph.D.
University of Michigan, 1956

The purpose of this study is to investigate and present to the Western reader one significant area of Japan's modern literature, the proletarian literary movement, which has not yet been dealt with outside of Japan. The importance of this movement arises from the fact that it is at once part of a world-wide proletarian literary movement, and a major current in the development of modern Japanese literature.

Part I of this study traces the pre-history of the movement from the rise of the "civil rights movement" and early socialist literature of the Meiji Period (1868-1912), the development of a "popular arts movement" around the time of World War I, and the emergence of a group of worker writers during and after that war who may rightly be considered Japan's first proletarian authors. The organized proletarian literary movement, however, did not materialize until 1921 during Japan's first postwar economic recession which witnessed a strong upsurge of socialist thought.

Part II of this study examines the development of the movement proper in Japan from 1921 to its collapse in 1934. In particular, the evolution of proletarian literary theory and the proletarian short story and novel are traced through a succession of alignments and realignments of proletarian literary leagues and federations. This period is separated into three main sub-periods: (1) the period of the magazine *Tane-maku Hito* (1921-23) which saw a mixture of socialist, anarchist, and syndicalist elements mingled in the movement; (2) the period of the magazine *Bungei Sensen* (1924-27) which witnessed the initial appearance of an ideologically directed proletarian literature; and (3) the period of NAPF (All Japan Federation of Proletarian Artists) and KOPF (Japan Proletarian Culture Federation) (1923-34) which saw the proletarian literary movement dominated by a vanguard, fractional group of the Communist Party who developed proletarian literature almost exclusively as an art subordinated to the political service of that Party. Under government suppression, particularly after the Manchurian Incident in 1931, Japan's proletarian literary movement was increasingly curtailed and in early 1934 forced into "voluntary dissolution."

Part III of this study briefly traces the survival of the proletarian tradition in Japanese literature between 1934 and 1950. When the movement collapsed in 1934, the

majority of proletarian writers, who had intensely opposed Japan's imperialistic war, turned from the fight against war in effecting a *volte-face* to avoid indefinite prison terms. Several proletarian writers, however, continued their efforts to create a war-time literature of resistance, and succeeded in producing a number of novels artistically reflecting demands for democratic liberty, thus providing a bridge between the former proletarian literary movement and the democratic literary movement which arose as a successor to the former in late 1945.

The major conclusion of this study is that the demonstrable failure of proletarian literature in Japan to become a true national literature resulted from its lack of positive ties with the Japanese people, and further, that this failure provides a major signpost for the right direction of the postwar democratic literary movement.

526 pages. \$6.70. Mic 57-2843

WILLIAM HAZLITT'S THEORY OF LITERARY CRITICISM IN ITS CONTEMPORARY APPLICATION

(Publication No. 21,770)

Herschel M. Sikes, Ph.D.
New York University, 1957

Hazlitt saw life and literature as a unity and wrote on many aspects of it, sometimes mixing personal and political judgments with literary ones. But if his literary criticisms are studied carefully, the attacks on them as inconsistent, biased, impressionistic, or merely occasional prove unjustified. He held that the function of a critic is to search out and evaluate in a work of literature the artist's experience of nature, the art itself, the truth to the age, and the effectiveness for the reader--all of which should constitute a unity. The task of the critic is to grasp this unity and to aid the reader to comprehend it, or to indicate why and how far it was not achieved.

Though Hazlitt wrote no *Art of Criticism*, the principles of his literary theory and their affect on his opinions about Romantic literature are discoverable in his treatment of works by Wordsworth, Coleridge, Byron, Scott, Keats, Shelley, Southey, Campbell, Moore, Hunt, and Lamb. In the *Lyrical Ballads* but not in *Christabel* he found "sympathy"--the bond of disinterested humanity which unites reader and author. In Byron he found "gusto" or intensity but a defect of "nature"--balance between an artist's conception of an object and the object itself. Comparison of Byron and Scott reveals that a fusing of strong feeling and "appeal to actual objects" must take place before a work can achieve universal admiration; that a literary artist should achieve a golden mean between "disinterested objectivity" and "a mind preying upon itself."

Hazlitt recognized the literary tendencies of his age such as Wordsworth's dependence upon his own impressions, Coleridge's eclecticism, and Byron's singularity and intensity, and characterized them in order to portray the climate of ideas which nourished their works and which influenced younger writers like Keats and Shelley. Accordingly the "want of action and character" of *Endymion* was viewed as a fault of the age rather than of an individual, a defect of an intellectual climate characterized by minds preying upon themselves. Thus the critic's function was both analytical and corrective.

Hazlitt's criticism of his contemporaries was influential. Keats's theories about "poetical character," the problem of the artist's "identity," and sympathy as an artistic device, as well as Keats's practice show that he was more directly influenced by Hazlitt than most scholars have admitted. In turn, Hazlitt's criticism shows a perceptive understanding of the development and maturity of Keats, an understanding which has contributed to twentieth-century critical methods and appraisals of his work.

In Shelley's poetry Hazlitt saw admirable qualities of "colour" and "vitality" but also found extremes of "novelty" and intellectual isolation, a refusal of the disciplines of nature and sympathy which prevented fusion of "novelty" and "antiquity," of inner and outer.

Hazlitt used a method of contrast and comparison in order to illustrate the effects of major literary tendencies upon the lesser writers of his time. In Campbell, Crabbe, Moore, and Hunt, the critic found miniature examples of overdependence upon the internal and reiterated his principles of sympathy, gusto, and nature.

Hazlitt has not received his due as a critic of his contemporaries for five main reasons: his self-disparagement; the journalistic nature of much of his work; its inequalities; his failure to provide a full account of his principles; and the failure of many who have written about him to see his literary judgments as they are because these writers were overaffected by his powerful images and diction or because they insisted on coloring his judgments with biographical, political, or other extra-literary opinions.

Though Hazlitt was a journalist writing in order to live, his criticism of his contemporaries is not merely ephemeral. More than any other reviewer of his period his criticisms have permanent value and significance. The reasons for this permanence are numerous: his "unmercenary disinterestedness," the remarkably unified sensibility by which he fused thought and feeling and kept his head in an age of emotionalism, and his capacity for synthesizing, harmonizing, and integrating, for balancing complex elements with common sense and sympathy.

216 pages. \$2.80. Mic 57-2844

THE THEORY OF LONG PROSE FICTION IN FRANCE, 1750-1830

(Publication No. 21,931)

Elwyn Franklin Sterling, Ph.D.
Syracuse University, 1957

The problem involved in this dissertation was one of determining the significant trends in the expressed theory of long prose fiction in France between 1750 and 1830. The method called "the history of ideas" seemed most appropriate to its resolution.

Between 1750 and 1830, speculation about long prose fiction moved along sometimes parallel but always closely related lines toward realism and toward definition of an independent art form with its own *raison d'être*. The three classic concepts of didacticism, the external *bienséances* and the *plaire davantage* conflicted particularly with a faithful representation of manners and human behavior. However, the growing significance of verisimilitude gradually led to the rejection of all three. *Vraisemblance* acquired various meanings: plausibility of event defined by possibility of occurrence within man's social experience; and individualization of characters as well as the idea that they should bear the stamp of their time and place. As a result, long prose fiction gradually came to be considered both a faithful record of its time and to be historically and geographically determined.

Most significantly, verisimilitude acquired the meaning of a sustained illusion of reality. This gave rise to considerable speculation about technique. Theorists argued that long prose fiction should possess internal logic and be dramatized. They advocated the use of dialogue and of direct address and they condemned manipulation of characters by the author. Finally, they were preoccupied with the problems of impersonality, the intrusive author and point of view.

182 pages. \$2.40. Mic 57-2845

LIBRARY SCIENCE

THE SOUTHEASTERN UNITED STATES IN THE NOVEL THROUGH 1950: A BIBLIOGRAPHIC REVIEW

(Publication No. 21,667)

John Sykes Hartin, Ph.D.
University of Michigan, 1956

In 1557 the Gentleman of Elvas recorded in his *Relaçam Verdadeira* the event which became the prototype of the John Smith-Pocahontas legend. During the eighteenth century several works of prose fiction appeared which had locales in that part of the United States known commonly as the Southeast. Since 1922 not a year has passed without the appearance of at least one novel laid in the Southeast, and in 1950, 112 novels have been counted with southeastern

settings. It is because of this long tradition of setting that this study was undertaken.

The states included as comprising the Southeast are those which are so classified in Howard W. Odum's *Southern Regions of the United States*, namely Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. Also included as locales are the lower Mississippi River and the Ohio River when the contiguous land belongs to one of the states included.

A novel, for the purposes of this compilation, is a separately published work of prose fiction of approximately one hundred pages, usually with a single main plot and one or more sub-plots. A series of episodes or stories with some consistent and logical connection is regarded as a

single work; and novels of character with little emphasis on plot development are included, as well as cheap fiction and juvenile works. The only type of novel which has been omitted is the "dime novel."

Information about the novels included in this bibliography has been arranged in a consistent form, except where information is lacking for specific titles. This form is:

Author's name in full, with dates when obtainable.

TITLE OF THE WORK. followed by information of place, publisher, and date of publication; pagination, series notes.

LOCALE OF ACTION. Notes summarizing or annotating the plot, theme, or some other feature of the novel; its time of action when necessary; miscellaneous comments. Bibliographical notes, if any: place of the novel in a trilogy or longer series; sequels or antecedents; republication or change of title; and other items.

Items of information were gathered from local and regional author lists, histories of literature and of the novel, book reviews published in periodicals and journals or in standard book reviewing publications, from collections of fiction centered around the birth of the authors, encyclopedias, special fiction lists, and various book-trade publications. All items were checked in appropriate bibliographic tools and by direct examination when copies of the novels could be found for examination.

The arrangement of the bibliography is alphabetical by author. An index by the eleven states and by the Ohio and the Mississippi Rivers is included, keyed to the numbers given to the novels in the main body of the work. Novels which have indefinite locales are not included in the index.

Because the bibliography is a descriptive one, no critical conclusions have been attempted. It is apparent, however, that authors from all parts of the United States and from some foreign countries have found qualities in the Southeast and its people which are useful for the purposes of fiction, and this bibliography is a tool through which closer examination may be given to the novels which have employed the Southeast as a background.

646 pages. \$8.20. Mic 57-2846

INVARIANTS AND COVARIANTS OF
SYSTEMS OF LINEAR DIFFERENTIAL AND
INTEGRO-DIFFERENTIAL EQUATIONS

(Publication No. 17,526)

Smbat Abian, Ph.D.
University of Cincinnati, 1956

The invariants of a system of homogeneous differential equations under the continuous group of projective transformations, characterize the projective properties of the integral manifold of that system. In this sense they constitute the foundation of the projective geometry of a class of projectively equivalent varieties. In Part I of our thesis, we investigate the invariants of a system of $n \geq 2$ ordinary linear homogeneous differential equations of order $m \geq 2$,

$$(1) \quad \tilde{y}_i^{(m)} + \sum_{q=1}^m \sum_{j=1}^n A_{qij}(x) y_j^{(m-q)} = 0, \quad (i=1, \dots, n),$$

under the continuous group of projective transformations

$$(2) \quad y_i = \sum_{j=1}^n K_{ij}(x) \bar{y}_j \quad ; \quad \tilde{x} = \xi(x).$$

Throughout the work the matrix notation is adopted, so that (1) and (2) may be written respectively in the form

$$(3) \quad y^{(m)} + \sum_{q=1}^m A_q y^{(m-q)} = 0,$$

$$(4) \quad \bar{y} = K^{-1} y \quad ; \quad \tilde{x} = \xi(x),$$

where $y^{(t)}$ are n by 1 matrices with elements $y_i^{(t)}$; A_q are n by n matrices with elements $A_{qij}(x)$; K , an n by n matrix with elements $K_{ij}(x)$, (arbitrary functions of x); \bar{y} is an n by 1 matrix with elements \bar{y}_i , (the transforms of y_i); \tilde{x} , the new independent variable and $\xi(x)$, an arbitrary function of x .

The invariants are divided into four categories:

a) Seminvariants. b) Semicovariants. c) Invariants. d) Covariants. In a) and b) only the dependent variables are transformed by means of $\bar{y} = K^{-1} y$, and in c) and d) the dependent and independent variables are transformed by means of (4).

a) Seminvariants. We define a seminvariant of class Q and order R , ($m \geq Q \geq 2$; $R \geq 0$) of (1) as a function f of $A_{qij}(x)$ and their derivatives which enter in the form

$$f(A_{1ij}, \dots, A_{1ij}^{(Q+R-1)}; A_{2ij}, \dots, A_{2ij}^{(R)}; A_{Qij}, \dots, A_{Qij}^{(R)}),$$

and satisfy the equation

$$f(\bar{A}_{1ij}; \dots; \bar{A}_{Qij}^{(R)}) = f(A_{1ij}; \dots; A_{Qij}^{(R)}),$$

where \bar{A}_{qij} are the transforms of A_{qij} induced by $\bar{y} = K^{-1} y$.

There exists a transformation $z = K_0^{-1} y$, taking (3) into the semi-canonical form

$$z^{(m)} + K_0^{-1} \sum_{q=2}^m F_q z^{(m-q)} K_0 = 0,$$

where we show that the form of the matrices F_q is unique. We prove also that every seminvariant may be represented as a function of the elements of the matrices $F_{q,r}$ defined by

$$\begin{aligned} F_{q,0} &= F_q, \\ F_{q,1} &= F_q^{(1)} + \frac{1}{m}(A_1 F_q - F_q A_1), \\ &\dots \dots \dots \\ F_{q,r} &= F_{q,r-1}^{(1)} + \frac{1}{m}(A_1 F_{q,r-1} - F_{q,r-1} A_1). \end{aligned}$$

Furthermore, we prove that the transformation $\bar{y} = K^{-1} y$ induces the similarity transformation

$$(5) \quad \bar{F}_{q,r} = K^{-1} F_{q,r} K,$$

on the matrices $F_{q,r}$. From (5), we give explicit expressions for the seminvariants as functions of the traces of the matrix polynomials in $F_{q,r}$. By means of Lie's theory, we find that the number of independent seminvariants of class Q and order R of (1) is $N(n, Q, R)$, where,

$$N(n, 2, 0) = n, \text{ and } N(n, Q, R) = (QR + Q - R - 2)n^2 + 1, \text{ for } Q + R \geq 2.$$

b) Semi-covariants. We define a semi-covariant of height H , class Q and order R , ($m-1 \geq H \geq 0$; $m \geq Q \geq 2$; $R \geq 0$) of (1) as a function f of y_i and $A_{qij}(x)$, and their derivatives which enter in the form

$$f(y_1, \dots, y_1^{(H)}; \dots; y_n, \dots, y_n^{(H)}; A_{1ij}, \dots, A_{1ij}^{(Q+R-1)}; \dots; A_{Qij}, \dots, A_{Qij}^{(R)}),$$

and satisfy the equation

$$f(\bar{y}_1; \dots; \bar{A}_{Qij}^{(R)}) = f(y_1; \dots; A_{Qij}^{(R)}).$$

Using the semi-canonical form of (1), we prove that every semi-covariant may be represented as a function of the elements of the matrices $F_{q,r}$ and Y_h , where,

$$\begin{aligned} Y_0 &= y, \\ Y_1 &= y^{(1)} + \frac{1}{m} A_1 y, \\ &\dots \dots \dots \\ Y_h &= Y_{h-1} + \frac{1}{m} A_1 Y_{h-1}. \end{aligned}$$

Furthermore, we show that the transformation $\bar{y} = K^{-1} y$, induces the transformation

$$(6) \quad \bar{Y}_h = K^{-1} Y_h,$$

on the matrices Y_h . From (5) and (6), we obtain explicit expressions for the semi-covariants. The number of independent semi-covariants of height H , class Q and order R is found to be $(QR + Q - R - 2)n^2 + (H+1)n$.

c) Invariants. We define an invariant of class Q and order R , ($m \geq Q \geq 2$; $R \geq 0$), of (1) as a seminvariant of

the same class and order remaining unchanged under an arbitrary transformation of the independent variable given by $\tilde{x} = \xi(x)$.

Setting up the complete system of partial differential equations furnishing invariants, we obtain the number of independent invariants to be $I(n, Q, R)$, where,

$$I(n, 2, 0) = n - 2, \text{ and } I(n, q, r) = (QR + Q - R - 2)n - Q - R, \text{ for } Q + R \geq 3.$$

d) Covariants. We define a covariant of height H , class Q and order R , ($m - 1 \geq H \geq 0$; $m \geq Q \geq 2$; $R \geq 0$), of (1) as a semi-covariant of the same height, class and order remaining unchanged under an arbitrary transformation of the independent variable given by $\tilde{x} = \xi(x)$. By Lie's theory, we obtain the number of independent covariants to be $C(n, H, Q, R)$, where,

$$C(n, 0, 2, 0) = n - 2; C(n, H, 2, 0) = (H + 1)n - 3 \text{ for } 2 \geq H \geq 1, \text{ and}$$

$$C(n, H, Q, R) = (QR + Q - R - 2)n^2 + (H + 1)n - \max(H, Q + R) - 1 \text{ for } \max(H, Q + R) > 2.$$

In Part II of our thesis, we study the functional invariants of linear homogeneous integro-differential equations of order $m \geq 2$, under an arbitrary Fredholm transformation. In order to apply our methods of Part I to Part II, we first introduce integral operators. For each real number a and each function $k(x, u)$, continuous on the unit square, we make correspond the operator (a, K) mapping the set $\{g(x)\}$ of all continuous functions of a real variable, into itself by

$$(a, K)g(x) = ag(x) + \int_0^1 k(x, s)g(s)ds.$$

We call $k(x, u)$ the kernel of the operator (a, K) . The sum of two operators (a, K) and (b, H) is defined by $(a, K) + (b, H) = (a + b, K + H)$, where the kernel of the operator $(a + b, K + H)$ is the function $k(x, u) + h(x, u)$. The product of two operators (a, K) and (b, H) is defined by $(a, K)(b, H) = (ab, aH + bK + KH)$, where the kernel of the product is the function

$$ah(x, u) + bk(x, u) + \int_0^1 k(x, s)h(s, u)ds.$$

The set of operators (a, K) form a linear associative algebra over real number field, with the unit operator $(1, Z)$, whose kernel is the function $z(x, u) = 0$.

An integro-differential equation of order m , now is written in operator notation as

$$(6) \quad (1, Z)y^{(m)} + (0, A_1)y^{(m-1)} + \dots + (0, A_m)y = 0,$$

and the Fredholm transformation as

$$y = (1, K)\bar{y},$$

where the kernels of the operators depend not only on x, u but also on a third variable of differentiation t .

The existence of a semi-canonical form of (6) is established, and is written as

$$(1, Z)z^{(m)} + (1, K_0)^{-1} \sum_{q=2}^m (0, F_q)z^{(m-q)}(1, K_0) = 0,$$

where the operators $(0, F_q)$ are unique. From the operators $(0, F_q)$, we define the operators $(0, F_{q,r})$ analogous to what was done in Part I, and we show that the Fredholm transformation induces the similarity transformation

$$(0, \bar{F}_{q,r}) = (1, K)^{-1}(0, F_{q,r})(1, K),$$

on the operators $(0, F_{q,r})$. From this we prove that the traces

$$\text{tr} \prod_{q=2}^{Q,R} f_{q,r}(x, u; t) \text{ are functional seminvariants of (6),}$$

$$r=0$$

where the functions $f_{q,r}(x, u; t)$ are the kernels of the operators $(0, F_{q,r})$.

The notion of semi-covariants, invariants, and covariants may be extended to the case of integro-differential equations. Also, by introducing matrices with elements as integral operators, the same notions may be further extended to systems of integro-differential equations.

While it was possible for the case of systems of differential equations to give an analytic basis for the representation of the invariants, this same is not the case for the functional invariants of integro-differential equations.

This is due to the fact that there is no theory of complete systems of partial differential equations in infinitely many variables.

103 pages. \$2.00. Mic 57-2847

8-RINGS IN MINIMAL MAPS

(Publication No. 21,880)

Benno Theodor Goldbeck, Jr., Ph.D.
The University of Oklahoma, 1957

Major Professor: Arthur Bernhart

Work on the four-color problem, for maps on a spherical surface, has basically followed two trends. The synthetic approach starts with polygons and seeks reducible configurations. The analytic approach is a systematic study of irreducible rings. Rings of order five, six, and seven have already been studied. This dissertation examines 8-rings in minimal maps.

For an irreducible ring of eight regions, three sets of criteria are established. These criteria are Kempe equalities (E), primary inequalities (P), and secondary inequalities (S). Each peripheral 8-ring, not known to be reducible, was tested by these criteria. The equations (E) were solved simultaneously and the inequalities (P) and (S) were tested by machine. The entire class of twenty-seven configurations was shown to be irreducible (E), (P), and (S).

In addition to the twenty-seven geometric 8-rings, an algebraic solution was constructed. This example satisfied all of the 1,180 criteria in the three sets listed above, but was undrawable.

69 pages. \$2.00. Mic 57-2848

SOME PROPERTIES OF THE NÖRLUND METHODS AS AN ORDERED SET

(Publication No. 21,883)

Harold Vernon Huneke, Ph.D.
The University of Oklahoma, 1957

Major Professor: Dr. Casper Goffman

In this thesis a study is made of the Nörlund summability methods as an ordered set. The Norlund method

(N, p_n) is a triangular matrix method with the matrix of the transformation determined by a sequence of positive constants $\{p_n\}$ with $p_0 \neq 0$. The matrix of the transformation

$$(a_{mn}), m, n=0, 1, 2, 3, \dots, \text{ is such that } a_{mn} = \frac{p_{m-n}}{m} \text{ if } n \leq m \text{ and } a_{mn} = 0 \text{ if } n > m.$$

The Cesàro methods (C, α) , $\alpha > 0$, are the Norlund methods with $p_n = \frac{\Gamma(n+\alpha)}{\Gamma(n+1)\Gamma(\alpha)}$.

The order relation, strictly stronger than, between methods (N, p_n) and (N, q_n) is defined in the following manner. The method (N, q_n) is strictly stronger than the method (N, p_n) if every sequence limitable (N, p_n) is limitable (N, q_n) but there exist sequences limitable (N, q_n) which are not limitable (N, p_n) .

For two given methods (N, p_n) and (N, q_n) a third method (N, r_n) , called the symmetric product, is defined as follows:

$$(N, r_n) = (N, p_n) \circ (N, q_n) \text{ with } r_n = p_0 q_n + p_1 q_{n-1} + \dots + p_n q_0.$$

The results of greatest interest in the thesis are the following:

- The set of regular Norlund methods under the operation of symmetric product and the strictly stronger than order relation form an ordered semi-group.
- For any $\alpha > 0$ the set of Cesàro methods weaker than or equivalent to (C, α) and the set of Cesàro methods strictly stronger than (C, α) determine a cut in the ordered set of Cesàro methods and there is a non-denumerable set of non-equivalent Norlund methods in this cut.
- Given any sequence of regular Norlund methods, there is a regular Norlund method stronger than or not comparable with any method in the sequence; hence, there is no asymptotically most powerful sequence of regular Norlund methods.

45 pages. \$2.00. Mic 57-2849

ON SPACES SUITABLE FOR FINSLER GEOMETRIES IN THE LARGE

(Publication No. 21,917)

May Risch Kinsolving, Ph.D.
Syracuse University, 1957

Hopf and Rinow investigated the problem of determining which Riemannian surfaces are suitable for investigations "in the large."¹ They showed that even the class F_0 of surfaces which satisfy the weakest requirement of non-continuity to a larger surface, i.e., which cannot be embedded 1:1 and length-preserving onto a non-trivial subregion of a Riemannian surface, is too extensive in that it contains surfaces in which not every two points can be joined by a shortest path. Instead they proposed four more restrictive surface classes (F_1, F_2, F_3, F_4) , all of them defined conceptually in a different way, and then showed 1) that they actually encompass the same surfaces, 2) that every two points of these surfaces can be joined by a shortest path, and 3) that all four surface classes are contained in F_0 , i.e., $F_0 \supset F_1 = F_2 = F_3 = F_4$.

In the present paper the space classes F_0, F_1, F_2, F_3, F_4 , and a newly introduced space class \bar{F}_1 are investigated

with regard to possible "completeness" requirements for n-dimensional Finsler spaces and for n-dimensional non-differentiable Finsler spaces. The relationships of these space classes are also investigated for G- and E-spaces, in the sense of Busemann, and singular G- and E-spaces. A space is said to belong to class \bar{F}_1 if it is a non-continuable space in which every two points x,y can be joined by a path from x to y of length equal to the distance $\rho(x,y)$ from x to y. The class \bar{F}_1 thus consists of spaces with the two most desirable properties as far as considerations "in the large" are concerned.

For n-dimensional symmetric [i.e., $\rho(x,y) = \rho(y,x)$] and non-symmetric Finsler spaces, and hence for Riemannian spaces as well, it is shown that $F_0 \supset \bar{F}_1 \supset F_1 = F_2 = F_3 = F_4$ and that $F_0 \neq \bar{F}_1 \neq F_1$. The fact that $F_1 \supset F_2$, in the symmetric case, as well as some properties of \bar{F}_1 are shown by using methods employed by Hopf and Rinow, although the class \bar{F}_1 was not considered in their paper. An entirely new proof is given to show that for non-symmetric Finsler spaces $F_1 \supset F_2$, since the corresponding proof of Hopf and Rinow strongly uses the symmetry property of the Riemannian metric. In order to show that $F_1 = F_3 = F_4$ and that in a space of class F_1 every two points x,y can be joined by a path from x to y of length equal to their distance $\rho(x,y)$, we generalized, for the sake of conciseness, methods used by de Rham in the case of Riemannian spaces.² Hereby it turned out that one of de Rham's proofs involving the relationship between F_1 and F_3 is incomplete. A new proof is given in this paper.

For n-dimensional symmetric and non-symmetric non-differentiable Finsler spaces it is shown that $F_0 \supset \bar{F}_1 \supset F_2 = F_3 = F_4 \supset F_1$ and that $F_0 \neq \bar{F}_1 \neq F_2 \neq F_1$. These spaces are of interest since a study of them is equivalent to an investigation of which properties of Finsler spaces are due to the differentiability of the fundamental function $F(x, \xi)$, which determines the metric of a space at a point x in the direction ξ , and hence which properties are independent of this differentiability. It is shown that neither the methods of de Rham nor those of Hopf and Rinow can be generalized for non-differentiable Finsler spaces. Hence, entirely new proofs are given establishing the above results.

For G- and E-spaces it is shown that $F_0 \supset \bar{F}_1$; $F_0 \neq \bar{F}_1$; $\bar{F}_1 \neq F_1, F_2, F_3, F_4$; $F_1, F_2 \supset F_3 \supset F_4$; $F_1, F_2 \not\subset F_0, \bar{F}_1, F_3, F_4$. G- and E-spaces were constructed by Busemann partly with a view to establishing axiom systems for symmetric and non-symmetric Finsler spaces of class F_4 . Symmetric Finsler spaces of class F_4 are G-spaces and non-symmetric Finsler spaces of class F_4 satisfy the E-space axioms. However, G- and E-spaces are neither symmetric nor non-symmetric Finsler spaces, in general.

Non-differentiable Finsler spaces of class F_4 need not satisfy all the G- or E-space axioms. However, they are singular G- or singular E-spaces depending upon whether they are symmetric or non-symmetric respectively, but the converse again does not necessarily hold. It is shown that for singular G- and singular E-spaces $F_1 \not\supset F_3$ and $F_1 \not\supset F_4$, but that all of the other class relationships established for G- and E-spaces do hold. 82 pages. \$2.00. Mic 57-2850

1. H. Hopf and W. Rinow, "Ueber den Begriff der vollständigen differentialgeometrischen Fläche," *Comm. Math. Helv.*, III (1931), 209-225.

2. G. de Rham, "Sur la réductibilité d'un espace de Riemann," *Comm. Math. Helv.*, XXVI, (1952), 328-344.

DIFFERENTIAL CALCULUS IN HILBERT SPACES

(Publication No. 21,887)

Anthony Edward Labarre, Jr., Ph.D.
The University of Oklahoma, 1957

Major Professors: Albert A. Grau, and John B. Giever

The concept of a derivative, or equivalently a differential, is one of the leading ideas in the differential calculus. Frechet introduced the parallel concept in normed linear spaces in 1925, and even though some noteworthy advances have been made through the notion of the Frechet differential, it has never enjoyed the enviable position which the differential of classical analysis holds in the theory of functions of a real variable.

In this work, a variant of the Frechet differential is presented employing a geometric point of view instead of an analytic one. Using the analogue to the idea of projecting a secant into the tangent line of a curve, the differential of a function is defined and its basic properties developed. The geometric definition is shown to agree with the Frechet definition for bounded operators on a Hilbert space.

The present concept of differentiability is restricted to functions defined in a Hilbert space. However, the restriction is not without some advantages: It is found that the norm of a real Hilbert space is a differentiable function (except at the origin) but that in general the norm of a normed linear space is not Frechet differentiable. For unbounded operators, the geometric definition applies just as well as for bounded operators. It is hoped that this will lead to an extension of certain applications of the Frechet differential which until now hold only for bounded operators.

56 pages. \$2.00. Mic 57-2851

A THEOREM ON SPIRALS IN THE PLANE

(Publication No. 21,033)

William S. Mahavier, Ph.D.
The University of Texas, 1957

Supervisor: R. L. Moore

It follows from the results of J. T. Mohat (Bull. Amer. Math. Soc. Abstract 60-6-772t) that if R is a rectangular disc in the Euclidean plane such that each side of R is either vertical or horizontal, then there is a reversibly continuous transformation of R into itself such that if I is a vertical interval whose endpoints belong to the boundary of R and which lies, except for its endpoints, wholly in the interior of R , then the image of I under this transformation is a spiral with only one whirl point. In the present paper it is shown that there is a reversibly continuous transformation of R into itself such that if I is either a vertical or a horizontal interval whose endpoints belong to the boundary of R and which lies, except for its endpoints, wholly in the interior of R , then the image of I under this transformation is a spiral with only one whirl point.

28 pages. \$2.00. Mic 57-2852

ESTIMATION OF PARAMETERS OF MIXED EXPONENTIALLY DISTRIBUTED FAILURE TIME DISTRIBUTIONS FROM CENSORED LIFE TEST DATA

(Publication No. 21,896)

William Mendenhall, 3rd, Ph.D.
North Carolina State College, 1957

Supervisor: Robert John Hader

This dissertation has been concerned with failure populations which can be subdivided into sub-populations representing different types of failure. The s sub-populations were assumed to be mixed in unknown proportion $p_1 : p_2 :$

$$\dots : p_s, \text{ where } 0 \leq p_i \leq 1, i = 1, 2, \dots, s, \text{ and } \sum_{i=1}^s p_i = 1.$$

The sub-population cumulative failure distributions, $F_i(t)$, were assumed known except for the parameters which were to be estimated for censored sampling with a fixed test termination time, T .

Conditional mixture proportions, $p_i(t)$, $i = 1, 2, \dots, s$,

$$0 \leq p_i(t) \leq 1, \text{ and } \sum_{i=1}^s p_i(t) = 1, \text{ were defined as the proportions in which the sub-populations are mixed at time } t.$$

Estimation problems were considered for the special case where $s = 2$ and the failures for each sub-population were exponentially distributed with average lives, β_1 and β_2 , expressed in units of size T . The maximum likelihood estimates of the population parameters were shown to be linear functions of the conditional mixture proportion, $k = p_1(t = T)$, where T is the test termination time. A simple iterative computational procedure was introduced for the solution of the estimating equations. An adjusted estimation procedure was proposed to improve the estimation when the relative magnitude of the sub-population parameters is known.

The means and variances of the estimates were obtained empirically and presented in tabular form for various combinations of the parameters, $\beta_1 = .2$ to 1.0 , $\beta_2 = .6$ to 3.2 , $p = .05$ to $.35$, and sample sizes, $n = 50, 100, 200$. The asymptotic variances of the maximum likelihood estimates were computed for certain parameter points in order to enable a comparison with empirical results.

The maximum likelihood estimation procedure gives satisfactory results when the sample size n is large and T is large relative to α_1 and α_2 . However, the maximum likelihood estimators are badly biased and have large variances when n and T are small. When the relative magnitude of α_1 and α_2 is known, the adjusted estimation procedure, discussed in this dissertation, can be used. The bias and the variance of the adjusted estimates are much less than for the maximum likelihood estimates when the sample size n is small and T is small relative to α_1 and α_2 .

The asymptotic variances and covariances of the maximum likelihood estimates vary inversely as the sample size, n . The relative magnitude of the covariances to the variances is independent of n and diminishes as T increases. As T becomes large, the variance of β_i approaches $\beta_i^2/E(r_i)$, where E stands for expected value; similarly, the variance of p approaches pq/n .

The mixed failure population model was generalized to include any number of sub-populations of failures

distributed according to Weibull distributions having different, but known, shape parameters. The maximum likelihood equations for estimating the parameters were shown to be simple functions of the conditional mixture proportions, $k_i = p_i(T)$, $i = 1, 2, \dots, s$.

82 pages. \$2.00. Mic 57-2853

THE STRUCTURE OF UNIFORM SEMIGROUPS

(Publication No. 21,862)

Donald Wright Miller, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Richard H. Bruck

This thesis investigates the structure of semi-groups S having the property that, for every pair a, b of elements of S , $aS \cup Sa = bS \cup Sb = T$. Such a semigroup is said to be uniform. If in addition $T = S$ then S is termed completely uniform. Completely uniform semigroups have been studied earlier, but always under additional restrictions.

A semigroup L such that $xy = x$, all x, y in L , is called a left semigroup; right semigroups are defined analogously. It is shown that a semigroup which contains at least one idempotent is completely uniform if and only if it is isomorphic to the direct product of a left (or right) semigroup and a group.

A semigroup Z is said to be a zero semigroup provided that Z^2 consists of a single element. The following three conditions on a semigroup S are proved to be equivalent:

- (i) S is uniform and contains exactly one idempotent;
- (ii) S is isomorphic to a subdirect product of a zero semigroup and a group;
- (iii) $aS = Sb$ for every pair a, b of elements of S .

The problem of characterizing the class κ of all uniform semigroups which contain more than one idempotent is then considered. Beginning with an arbitrary group and two disjoint sets a method is specified for the construction of such semigroups. That this construction yields the entire class κ is then shown by means of an analysis of a typical semigroup S belonging to κ , in terms of the subset E of idempotents of S , a maximal subgroup G of S , and the set Z of all elements of S which are not representable as products.

The final section of this thesis is concerned with uniform semigroups which contain no idempotents; it is shown that if S is such a semigroup then S^2 is either right simple or left simple. If in particular S is completely uniform then, by a result of Teissier [C. R. Acad. Sci. Paris vol. 236 (1953), p. 1122], S is imbeddable in a generalized Baer-Levi semigroup.

The principal result of this section is the following generalization of another theorem due to Teissier [ibid, p. 1121]. Let S be a semigroup without idempotents which satisfies the right cancellation law and has the property that S^2 is right simple. Then S is imbeddable in a Baer-Levi semigroup.

45 pages. \$2.00. Mic 57-2854

HOMOGENEOUS STOCHASTIC PROCESSES

(Publication No. 20,169)

John William Woll, Jr., Ph.D.
Princeton University, 1956

A homogeneous process is defined as a weakly continuous stationary Markov process commuting with the operations of G on a homogeneous space (X, G) . We require that G act transitively on X and that $\{a \in G \mid a(x) = x\}$ is compact. When considered as a semi-group with transition probabilities $\delta^x T_t(\cdot)$, the adjoint process restricted to the invariant subspace of continuous functions constant at infinity need not be strongly continuous, but it becomes so when induced on a suitable identification space.

We show under very general conditions that for a strongly continuous homogeneous process $\delta^x T_t(\cdot)/t \rightarrow a$ not necessarily bounded measure, Q_x , on $X - \{x\}$ as $t \rightarrow 0$. In this case the domain of the infinitesimal generator, $D(A)$, admits a smoothing operation in the sense that $f_1, f_2 \in D(A)$, J_1, J_2 open, g continuous and constant at infinity, $g = f_i$ on J_i , and D_i compact $\subset J_i$, imply there exists for each $\epsilon > 0$ and $h \in D(A)$ such that $h = f_i$ on D_i and $\|h - g\|_\infty < \epsilon$. The paths of the process are investigated in moderate detail and their discontinuities are used to uniquely characterize Q_x .

We use a substitute for convolution on homogeneous spaces and in terms of this we can define and investigate a special class of homogeneous processes, the compound Poisson processes. The compound Poisson processes are dense in the set of all homogeneous processes in a suitable sense, and they are the only homogeneous processes on (X, G) if X is discrete.

In the last chapter we give a new definition of subordination and verify its equivalence with the established concept. Subordination of homogeneous processes on groups is studied, and we show on R^n that if the support of the measure of the Poisson part of a homogeneous process is bounded, this process is subordinate only to itself and in certain rare instances a Bernoulli process. Actually somewhat stronger statements are true, but we prove these for R only.

98 pages. \$2.00. Mic 57-2855

A PROBLEM-SEQUENCE DEVELOPMENT OF INTRODUCTORY TOPOLOGY

(Publication No. 21,934)

Luke Nicholas Zaccaro, Ph.D.
Syracuse University, 1957

This paper was written with two primary objectives:

- (1) To present general topology for the beginning student by a carefully arranged sequence of problems which leads the student along step by step in a natural development of the subject.

- (2) To furnish a teaching aid in the form of a problem source and a suggested sequence of topics.

During the student's mathematical training he is gradually introduced to rigor by a formal demonstration of proofs which someone else has devised. This paper is an attempt to take him one step further in his training. The instructor is to limit himself to making clear to the

student what is given and what is wanted, and leave the formal demonstration to the student's ingenuity. Thus, the student not only acquires the facts and methods of topology, but he also develops a technique for formulating a rigorous proof. While it is true that a student of mathematics does get some of this learning by doing, in most cases there is no sustained continuity of this discipline.

To carry out the stated objectives, this work is presented in three parts:

- (1) The problem-sequence development of general topology.
- (2) Applications and supplementary problems.
- (3) Hints and procedures on the solutions to the problems.

As the student begins this problem-sequence study of topology, he understandably encounters many difficulties. This is the reason for part (3) - hints on the solutions. If a problem proves to be extremely difficult, the student should consult only the first significant step in the solution, and then try again.

The following is a list of the sections with some of the important topics included in each.

I. TOPOLOGICAL SPACE: The definition of a topological space in terms of Hausdorff's neighborhood axioms, the concept of a basis, the closure axioms of Kuratowski, a set of axioms using "accumulation set" as an undefined term, and the notion of a relative topology.

II. SOME DEFINITIONS AND FUNDAMENTAL CONCEPTS: Interior, exterior, and boundary of a set, dense subsets, nowhere dense sets, and the countability axioms of Hausdorff.

III. THE SEPARATION AXIOMS: A careful treatment of the separation axioms and the resulting T-spaces.

IV. CONTINUOUS AND TOPOLOGICAL MAPPINGS: Continuous and topological mappings, topological property, real-valued mappings, Urysohn's lemma, and the concept of a topological product space.

V. METRIC SPACE: Metric and metrizable spaces, boundedness, convergence, coverings, compactness, bi-compactness, and ϵ -nets.

VI. COMPLETE SPACE: Cauchy sequence, complete spaces, and first and second category sets. Also included is a sequence of problems demonstrating that any metric space can be imbedded in a complete metric space.

VII. CONNECTEDNESS: Connectedness in a topological space, a T_1 -space, and in E^1 . Also, components, simple chains, and the Hahn-Mazurkiewicz theorem are included.

VIII. APPLICATIONS AND SUPPLEMENTARY PROBLEMS: An analysis of the Cantor ternary set, F_σ and G_δ sets, and uniform convergence. Also presented are some "theorems for reference work," which are designed to take the student to the literature.

219 pages. \$2.85. Mic 57-2856

MUSIC

ENGLISH HYMNS AND THEIR TUNES IN THE SIXTEENTH AND SEVENTEENTH CENTURIES

(Publication No. 21,942)

Edna Dorintha Parks, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Karl Geiringer

The purpose of this research was to supply information necessary to clarify our understanding of the first English hymns and tunes. The objectives of this writer were:

1. To establish the fact that congregational hymn singing has never been forbidden in the Anglican church and has been used since the Reformation was established by Elizabeth I.
2. To examine the early hymn tunes against the background of the musical practice of the period, and ascertain from an analysis of the music if these small compositions reflected the transition from the sixteenth century strict polyphonic writing based on the ecclesiastical modes, to the chordal writing of the seventeenth century; the latter using major and minor scales and a freer treatment of dissonance.
3. To make available an index of the first lines of English hymns written between 1539-1707, showing the date of their first publication, and the earliest date at which they were sung.

For the purpose of the research, hymn was defined in

much the same way as the definition given by Carl F. Price in his article "What is a Hymn" published in The Papers of the Hymn Society, No. 6, New York, 1937. A hymn was poetry suitable for congregational singing when joined with a tune. It expressed either God's purpose in the life of man or man's praise or prayer to God. Throughout the dissertation hymn referred to poetry; hymn tune, to music.

The dates 1539-1707 were chosen for the limits of the period covered in the index because the first English hymns were published around 1539, and 1707 was the date of Isaac Watts' first hymnal. It has been thought that Isaac Watts was the "father of the English hymn." A few writers have indicated that this idea was not grounded on fact, but no detailed study had been made of the hymns written before the time of Watts. The number of hymns written between 1539 and 1707 was sought by this writer to prove that the freely composed hymn in England was a well established form before the time of Watts.

Every effort was made to distinguish between freely composed hymns and psalms in meter, scriptural paraphrases, and translations from other languages. Only freely composed hymns, written originally in English, were included in the index.

The realization of the objectives of the research showed the following results:

1. Quotations from psalters and hymnals showed nine bases for the belief that congregational hymn singing in the vernacular dated from 1559 in the Anglican church.
2. The tunes faithfully reflected the musical practice

and atmosphere of the period in which they were written.

3. The tunes which were capable of arousing the finest religious experiences, even though not as popular as other tunes of the period, were necessarily those which in themselves were works of art. These tunes have survived and are being used to-day.

4. The index of first lines of hymns written in English between 1539-1707 showed 960 hymns by 60 authors, 60 hymns by unidentified authors, and 7 hymns by unknown authors but dating from the period. This number was sufficient to dispel the idea that the English hymn was born with the publication of Watts' hymns.

5. The contribution of Isaac Watts would seem to have been the successful way in which he merged the very free paraphrase of the psalm with the already flowing stream of freely composed hymns, and won acceptance for the religious song which resulted from this union. The sharp distinction between metrical psalms and freely composed hymns was usually not made after his publications.

455 pages. \$5.80. Mic 57-2857

DEVISING A TEST TO MEASURE SOME AREAS OF DIFFICULTY IN READING PIANO MUSIC

(Publication No. 21,929)

James Curtis Shake, Ph.D.
Syracuse University, 1957

The fact that many people who have worked at playing the piano over a period of years are unsure of themselves in situations demanding reading piano music at sight stimulated research and experimentation in developing a test (comparable forms A and B) which would determine some areas of difficulty in this act.

Although a brief survey of language reading research showed over sixty language reading tests, a thorough investigation of music reading research failed to divulge any reports of measurement of sight reading piano music in a total reading situation.

Preliminary experimentation with nine students of varying age, pianistic experience, and technical fluency seemed to substantiate a belief that given a sufficient amount of material, people with varying amounts of technical ability would tend to display reading habits, and therefore some problems, in sight reading music of elementary technical level.

Thirty parts (pieces) of either single or double period were composed for each test. On the judge's sheet (duplicate forms of the subject's test) were put five marks, around individual notes or indications, in each part. Each part was judged as to whether the subject followed the tempo indicated, ☐. Pitch, ☐, duration, ☐, and dynamics, ☐, were also checked at four other individual points throughout each part.

Subjects were thirty-seven college girls ranging in age generally from nineteen to twenty-one and in previous experience from ten weeks of class piano to eight years of private study plus ten weeks of class piano.

A written test incorporating marks which would appear in the sight-reading tests was given to the group prior to the individual performance tests.

Each subject started reading at the beginning of the test and was stopped at the end of fifteen minutes. The performance was recorded on plastic-backed recording tape so that six judges (five faculty members of a music school plus a graduate student) could listen to the tapes at a later time and score the tests from them. The second form of the tests was given one week later.

After tabulation of each judge's scoring of the eighteen and one-half hours of performance (72 fifteen-minute readings), statistical analysis of the results was made in the following ways:

1. Pearson Product Moment Correlations for each judge between each score area plus total score on Test A and Test B.
2. Pearson Product Moment Correlations between each pair of judges in each of the above areas.
3. An Analysis of Variance between judges (F test).
4. A Test of Difference Between Measures of Mean Scores (matched t test)
5. Pearson Product Moment Correlations between Performance Test Scores (four sub-areas plus total) and Written Test Scores.
6. Pearson Product Moment Correlations between Performance Test Scores (four parts and total) and Years of Previous Study.

Several conclusions were drawn from the results of the statistical analysis. Among them were:

1. The two forms of the test examine ability to read and interpret through performance various pitches, rhythms, tempos, and dynamic markings in sight reading piano music.
2. They seem to distinguish adequately between good and poor readers among college-age girls with from ten weeks to eight years of instruction in piano.
3. The test had a high enough ceiling for the subjects involved in the research.
4. The test is a reliable instrument. Total score, pitch, and duration are reliable for upper-class college-age girls with up to eight years training in piano (and possibly for all college-age students). Rank order is reliable when judged by musicians of varying musical experience and professional recognition. Median correlations on total score for intra- and inter-judge relationships were .9555 and .9557 respectively.
5. Although all judges had high agreement on rank order, one judge gave consistently higher scores than the others.

The author recommends training personnel to record not only what was called for on this test, but to reproduce on the judge's sheet each error that was made so that more thorough diagnosis of sight reading piano music could be achieved.

152 pages. \$2.00. Mic 57-2858

PHARMACOLOGY

INTRACELLULAR POTASSIUM

(Publication No. 22,006)

Joseph Vincent Auditore, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor William C. Holland

The intracellular distribution of potassium in the liver, kidney, brain, and adrenal gland of the guinea pig, rat, rabbit, and cat was investigated. Our studies show that approximately 65-80 per cent of the tissue potassium is in the soluble fraction of the cytoplasm. A smaller quantity is present in the mitochondrial fraction (12-15 per cent). The brain appears to be an exception in that a relatively large fraction (30 per cent or more) of the total brain potassium is present in the mitochondrial fraction. The values are minimal ones and are probably higher in the intact cell.

The effects of a number of pharmacological agents as well as certain adrenal hormones on the intracellular distribution of potassium in a number of tissues *in vivo* were investigated.

Following adrenalectomy, it was found that the potassium ion content of the soluble fraction (cytoplasm and extracellular space) of the kidney was elevated. The potassium ion content of the mitochondrial fraction of the kidney was lowered. The potassium ion content of the soluble fraction of the liver was also lowered. Small doses of DOCA readily reversed these potassium alterations. Large doses of DOCA produced a profound fall of potassium in the soluble fraction of the kidney.

In amounts that produced a maximal diuretic response, the diuretic drugs caused a loss of potassium from the soluble fraction of the kidney. However, in toxic doses the mercurial diuretics caused a reduction of the potassium ion content of the mitochondria.

Epinephrine and nor-epinephrine cause a loss of potassium from the liver of cats. Intracellular distribution studies showed that the ion disappeared primarily from the soluble fraction of liver following the intravenous administration of these agents. Epinephrine had an additional effect not shown by nor-epinephrine in that the former substance caused a loss of potassium from the mitochondrial fraction. In this respect epinephrine behaves in a manner similar to 2,4-dinitrophenol. The latter compound also caused a loss of potassium from both the soluble and mitochondrial fractions of the brain when injected into the cerebrospinal fluid of cats.

Adrenochrome and 5-hydroxytryptamine were completely inactive *in vivo*. When tested on isolated mitochondria however, these compounds accelerated the loss of mitochondrial potassium.

Insulin in doses that produced convulsions (10-15 units/kg.) released epinephrine and nor-epinephrine from the adrenal medulla. The amines are normally stored in mitochondrial-like granules within the cytoplasm of the medullary cells. Furthermore, it has been observed that the potassium content of the soluble and granular fraction

increased. Apparently, potassium entered the granules to replace the lost amines. In this manner electroneutrality was maintained. This interesting observation illustrates one of the important roles of potassium in the overall metabolism of the cell.

From these studies it appears that the potassium ion is able to diffuse freely between the various intracellular compartments. Furthermore, the potassium content of the cytoplasm and mitochondria can vary simultaneously, independently, or probably one at the expense of the other.

A complete understanding of the mechanisms controlling this normal distribution of potassium must await full assessment of the role played by the cytoplasm and mitochondria in this fundamental phenomenon. The metabolic reactions in the mitochondria probably furnish energy for cation transport in the form of high energy phosphate compounds such as adenosine triphosphate. The specific cation transport systems utilizing this energy are present in the cell and mitochondrial membranes.

110 pages. \$2.00. Mic 57-2859

A STUDY OF THE DEPRESSOR AFTEREFFECTS OF NOREPINEPHRINE

(Publication No. 21,969)

Kenneth Charles Back, Ph.D.
The University of Oklahoma, 1957

Major Professor: Harold A. Shoemaker

The therapeutic use of norepinephrine to correct shock-like states has been found to produce two disturbing effects: Some patients require increasing doses of the agent in order to maintain the blood pressure at normotensive levels; and some are found who do not tolerate abrupt removal of the drug.

The purpose of this investigation has been to study the mechanisms responsible for the depressor effect of norepinephrine both during and following long-term infusion.

The depressor aftereffect of norepinephrine was produced by infusing dogs with high doses of the drug over a period of several hours. Long-term infusion invariably shows two distinct effects: 1) The blood pressure rises precipitously at first, but then gradually falls to or below pre-infusion levels; 2) after discontinuing the infusion, the blood pressure falls to an even lower level. These studies indicate a progressively decreasing cardiovascular response to the pressor effect of norepinephrine.

Most of the infused animals which were autopsied showed by gross inspection, ischemia of the viscera, acute passive congestion of lungs and limbs, distention of the stomach by gas, and recent focal hemorrhages of the lungs.

Dibenzyline, an adrenergic blocking agent, has been reported to inhibit vasodepressor material (VDM) in the

ischemic livers of rats, and thus, protect against shock. It did not protect against the depressor effect of infused norepinephrine in this study.

GD-131, which is similar chemically to Dibenzylamine but a very weak adrenergic blocking agent, did not protect against the post-infusion hypotension due to norepinephrine.

Dogs infused with norepinephrine showed a moderate degree of hyperglycemia.

The ganglionic blocking effect of norepinephrine was tested and not thought to be a major factor in the development of the vasodepressor effects of norepinephrine.

Ephedrine, Pyribenzamine, Trimeton, and Benadryl augment the pressor effect of both single doses and infused norepinephrine. Thephorin and Antistine inhibit the pressor effect of norepinephrine and epinephrine. Ephedrine, Pyribenzamine, Trimeton and Benadryl have been reported to be amine oxidase inhibitors. They augment the pressor effect of infused norepinephrine but do not protect against the post-infusion hypotension. The results of these experiments are compatible with the theory that norepinephrine is being destroyed by amine oxidase.

Dogs pretreated with Pyribenzamine are extremely sensitive to pressor amines and can be used for the bioassay of urine from patients suspected of having pheochromocytoma.

78 pages. \$2.00. Mic 57-2860

A STUDY OF THE 'ARTIFICIALLY-INDUCED' AND 'NATURAL' LUPUS ERYTHEMATOSUS CELL PHENOMENA

(Publication No. 21,972)

Charles Henry Farr, Ph.D.
The University of Oklahoma, 1957

Major Professor: Richard W. Payne

The L.E. (Lupus Erythematosus) cell phenomenon has stimulated considerable investigation. Reports that this phenomenon has been observed in other diseases of the ground substance, hypersensitivity states and various other disease states, would indicate that this phenomenon represents a more general cellular response.

Various methods of producing the phenomenon have been developed and a chemical agent has been reported to induce the phenomenon in normal blood. The chemical production of this cellular reaction is the subject of the present study which has also been concerned with simplification of conditions necessary for production of the phenomenon and analysis of the cellular changes incidental to it.

Cetyltrimethylammonium bromide (CTAB) was found to induce a L.E.-like phenomenon in normal blood and this "artificial" L.E. phenomenon was studied in detail.

A four-point system of grading the cellular changes was adapted to facilitate quantitative measures of advancement of the phenomenon. Grade I represents the first recognizable cellular deviation from the normal and Grade IV the most advanced product, the L.E. cell; with Grades II and III as intermediate stages in the cellular phenomenon.

It was determined that one mgm CTAB/ml of blood, incubated two hours at room temperature, was optimal for production of this phenomenon.

The slight shift in pH balance induced by CTAB in

normal blood was found not to account for the L.E. phenomenon.

Positive CTAB-L.E. cells were produced with the blood of two out of 25 human subjects, one normal and one diagnosed as degenerative arthritis. CTAB produced L.E.-like cells in blood from one rabbit and one rat of several animals tested.

Adding calcium, magnesium, potassium or zinc did not enhance the action of CTAB. Oxalation of blood with precipitation of calcium or heparinization did not alter the reaction.

Pre-incubation of normal serum with CTAB did not produce any significant change in activity.

Certain chemical agents, representing basic chemical groups of the CTAB molecule, were without effect insofar as initiating the L.E. phenomenon in normal blood.

Inclusion bodies of both the L.E. cell and CTAB-L.E.-like cell were methyl green-pyronin Y and Feulgen positive, suggesting the presence of desoxyribose nucleic acid.

CTAB and L.E. factor added together in normal blood will inhibit the L.E. phenomenon.

Nucleophagocytosis and erythrophagocytosis are sometimes produced by CTAB in normal blood but in general it appears that CTAB is injurious to all cells and probably does not stimulate phagocytosis.

It was concluded that CTAB will, under proper circumstances, produce L.E.-like cells in normal human and animal blood but the results are unpredictable. The CTAB molecule as a whole is responsible for its activity and this activity will inhibit the natural phenomenon when added to L.E. serum or factor in normal blood.

69 pages. \$2.00. Mic 57-2861

A STUDY OF THE ANTIBODIES PRODUCED IN RESPONSE TO PURIFIED PREPARATIONS OF OVINE INTERSTITIAL CELL-STIMULATING HORMONE

(Publication No. 21,794)

Sarah Snowden Henry, Ph.D.
Columbia University, 1957

Preparations of interstitial cell-stimulating hormone (ICSH) were isolated from beef and sheep pituitaries. The sheep ICSH was purified by repeated ammonium sulphate precipitations and by continuous electrophoresis on paper. Antiserum to highly purified sheep ICSH was produced in rabbits. By means of the Ouchterlony technique for the analysis of precipitins, it was possible to demonstrate the presence of antibodies to six different components. Absorption of the antiserum with sheep plasma, sheep tissues and fractions separated from crude sheep ICSH by continuous electrophoresis removed all of the precipitating antibodies except one. Antiserum so absorbed reacted to form a precipitate only with fractions containing ICSH activity and was capable of inhibiting the biological activity of sheep ICSH. In these studies hormone activity was measured by the increase in the ventral prostate weight of immature hypophysectomized rats. The absorbed antiserum inactivated sheep ICSH when the two were mixed *in vitro* and then injected into assay animals, or when the antiserum was given intraperitoneally to the test animals twenty-four

hours prior to the first assay injection. It was found that absorbed antiserum to sheep ICSH reacted *in vitro* to form a precipitate with crude beef ICSH. The precipitin bands produced by the reaction of the absorbed antiserum with beef and with sheep ICSH gave a "reaction of identity" as described by Ouchterlony. Antiserum to sheep ICSH was also capable of inhibiting the biological activity of beef ICSH. This antiserum, however, did not react *in vitro* with a highly purified preparation of hog ICSH nor did it inhibit the biological activity of hog ICSH. The antiserum to sheep ICSH also showed no reaction *in vitro* with, and had no effect on the biological activity of human chorionic gonadotropin. The antiserum failed to inhibit the biological activity of endogenously secreted rat ICSH when given over a period of fifteen days to 22-24 day old normal male rats. Although cross-reactions have been demonstrated between the human chorionic gonadotropin antigen-antibody system and the pneumococcus polysaccharide type XIV antigen-antibody system we found no reaction *in vitro* between the antiserum to sheep ICSH and pneumococcus polysaccharide type XIV. The identification of the anti-ICSH antibody *in vitro* has made it possible to use the antiserum for a qualitative *in vitro* test for the presence of the hormone.

77 pages. \$2.00. Mic 57-2862

THE EFFECT OF pH ON THE GASTRO-INTESTINAL ABSORPTION OF SALICYLATE IN RATS

(Publication No. 21,291)

Charles Kenneth Kolstad, Ph.D.
Purdue University, 1956

Major Professor: Dr. Glen J. Sperandio

The objective of this investigation was to determine the exact effect of pH on the absorption of salicylate from the gastro-intestinal tract of a rat. It was felt that in view of recent emphasis on timed or controlled medications, the study of a factor such as pH, which has an influence on the amount of drug absorbed from the gut, would provide information fundamental to the establishment and maintenance of a desired therapeutic level of a drug.

A simple and accurate method of studying the absorption of a drug introduced by Cori in 1926 was used in this study. The test animals were given a fixed dose of salicylate and the gastro-intestinal contents colorimetrically analyzed at the end of the absorption period.

The experimental data indicates that more of the salicylate was absorbed in 1 hour from a plain solution of sodium salicylate than from the buffered solutions. As the pH of the buffered solutions was increased the amount of drug absorbed decreased. The buffer ions evidently maintained the salicylate in a chemical form which was not so rapidly absorbed.

It was found that the absorption of salicylate during 1 hour was most inhibited by the solution with a pH of 8.2. For the purpose of studying the duration of the effect of pH, the plasma level of free salicylate and the amount of drug absorbed from the gut were determined at intervals up to 12 hours. The absorption of salicylate from a plain solution and a solution buffered to pH 8.2 was investigated.

At the end of 2 hours a significant change in the absorption rate was noted. Whereas the salicylate absorbed from the plain solution increased from 15.4 to only 15.8 mg., the amount of drug absorbed from the buffered solution markedly increased from 9.8 to 20.3 mg.

Comparison of the blood levels showed that at the end of 1 hour 2.3 mg. of salicylate were present in the plasma of the animals receiving the plain solution. Since 15.4 mg. of salicylate had been absorbed into the blood stream only 17% was present in the plasma as free salicylate. In the case of the solution with a pH of 8.2, 9.8 mg. of salicylate were absorbed and 3.09 or 30.5% was found as free salicylate.

At the end of 2 hours an additional 12 mg. of salicylate was absorbed from the solution with a pH of 8.2. The plasma level, however, only increased from 3.09 to 3.15 mg. Therefore, the amount of salicylate apparently bound by the plasma proteins increased from 34.5 to 84.4%.

The plasma level of free salicylate reached a peak at 3 hours in the case of both solutions. At this time, the animals receiving the plain solution had absorbed 15.8 mg. of the drug and had a free salicylate level of 2.94 mg. In comparison, the animals which were administered the buffered solution had absorbed 22.3 mg. of salicylate and the plasma level of free salicylate was 3.40 mg.

The plasma levels were also determined at 4, 6, 8, 10 and 12 hour intervals and it was found that the concentration of free salicylate decreased more rapidly in the case of the unbuffered solution of sodium salicylate.

This study has shown that the pH of a liquid medication definitely affects the absorption of salicylate from the gastro-intestinal tract of the rat. As the pH of the solution increased, the amount of salicylate absorbed decreased. The pH of the medication also had an influence on the fate of the salicylate in the blood stream. A greater per cent of the salicylate absorbed was present in the plasma as free salicylate when the drug was administered in a solution with a pH of 8.2. Thus, while a raised pH reduced the amount of drug absorbed from the gut, more of it was available for therapeutic action as free salicylate.

The results also indicate that a desired plasma concentration could be maintained with less frequent dosage. It was shown that a plasma level of 28 mg.% could be maintained with 3 daily doses of the drug in a vehicle buffered to pH 8.2. If the salicylate was given in an unbuffered solution, 8 doses would be required each day.

95 pages. \$2.00. Mic 57-2863

THE SYNTHESIS OF FLUORO-BROMO DERIVATIVES OF BENZOIC ACID TO BE EVALUATED AS RADIOGRAPHIC OPAQUES

(Publication No. 21,324)

Charles Henry Sprague, Ph.D.
Purdue University, 1952

Major Professor: Gustav E. Cwalina

Soon after the discovery of x-rays by Roentgen their application to medical diagnosis was begun. Contrast media, agents placed within the body to cause a certain area of that body to appear on an x-ray film, have been

developed from relatively crude materials such as metal sounds and bags of lead solutions (1) to the selective agents currently being used. What was said to be the greatest advance in the field of radiographic opaques was the introduction by Graham, Cole and Copher (2), in 1924, of tetrabromophenolphthalein as a diagnostic aid. Here was an agent which when taken by mouth would concentrate in the gall bladder in sufficient quantities to allow it to be visualized by x-rays.

Most radiographic opaques used today are iodinated compounds. In many cases they give satisfactory radiographs but it is well known that their use is too often attended by untoward side reactions. These include lacrimation, salivation, coughing spells, nausea, vomiting, fall in blood pressure, flushing of the face, a choking sensation and cyanosis. Although these symptoms usually disappear after a time, fatalities have occurred (3).

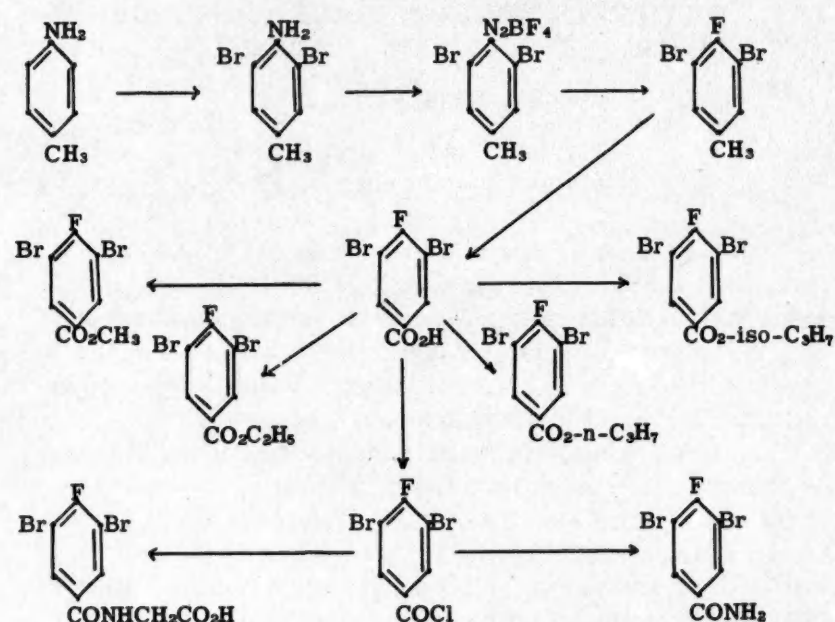
It has been said that the opacity of an element is proportional to the cube of its atomic weight (4). This is probably a misinterpretation of Hull's law which shows that the coefficient of absorption of all elements for x-rays varies approximately as the cube of the atomic number except in the immediate vicinity of one of the characteristic wave lengths of an element (5). It has been shown by Binz et al. (6), and Hull's law affirms it, that bromine has better opaque properties than iodine.

It has been reported that fluorine stabilizes other halogens in aliphatic compounds when the two are on adjacent carbon atoms (7). This led to the supposition that fluorine has the same effect when attached to an aromatic ring.

Verification of this supposition seems to be offered by the work of Mittelstaedt and Jenkins (8). Results of toxicity tests of some fluoro-iodo compounds which they prepared showed a low order of toxicity.

These facts led to the belief that a more satisfactory radiographic opaque might be discovered through the synthesis of certain bromo-fluoro compounds.

OUTLINE OF LABORATORY WORK



50 pages. \$2.00. Mic 57-2864

PHILOSOPHY

THE TRAGIC COMMITMENT: AN ESSAY IN EXISTENTIALIST METAPHYSICS

(Publication No. 22,036)

George Edward Brantl, Ph.D.
Columbia University, 1957

Existentialist analysis of experience leads to a philosophy of the tragic as an authentic human attitude, mediating between philosophies of hope (affirmation of Being) and of despair (negation of Being). In experience as self-expression the role of project reveals a triadic structure (spirit, essence, existence) and two dynamic levels of commitment (person and individual) which are found to be analogous to the dimensions of aesthetic creation. The distinction is made between the ontological (essential) and trans-ontological (existential) dimensions of experience; the nature and types of freedom are found in the interrelations of these dimensions. In the commitment of spirit to existence there is a polarity of contingency and inquietude, the simultaneity and irreducibility of which constitute the tragic. Types of contingency (essential and existential) are interpreted as the experience of non-being in its various manifestations. Inquietude as aspiration towards Being is seen to be an expression of moral freedom in the phenomenon of the *cogito*, conversion and the experience of

boredom and frustration; the extreme attitudes of the bohemian and the bourgeois are evaluated. The coexistence of inquietude and contingency as the tragic and other interpretations of the same phenomenon are analyzed. The metaphysical analysis is applied in Part Two to the tragic commitment as a way of life, an aesthetic and a philosophy. The tragic virtue of creative courage and the life-choice of the absurd lead to characteristics of the tragic life (scepticism, anguish, solitude, humor, freedom, guilt) in relation to objects, persons, society and community. In aesthetics tragic art is contrasted with arts of formalism, naturalism and ontological realism. The aesthetic is given primacy as tragic expression. The relation of art to life leads to the analysis of reflective experience where within systematic reflections techniques, problems and mystery are distinguished. Science, logic and ontology as reflections on problems are contrasted with metaphysics (existentialism) as reflection on mystery. Value-creativity is treated in relation to this distinction. Finally, existentialist metaphysics as a critique of essentialism is studied in its object, method, types, use of language and attitude to values. As a critique, its function is to maintain in experience the trans-ontological dimension of hope, despair and the tragic, and to proceed towards a critique of despair and ungrounded hope. Related historical questions are referred in each chapter to the Appendices where they

are treated: Medieval expressionism and legalism and its implied aesthetic; Sartre's nihilism; a critique of Scholastic theory of happiness; Camus on the rebel; irony, paradox, analogy and the absurd; problem and mystery in the philosophy of Marcel. 215 pages. \$2.80. Mic 57-2865

**A DESCRIPTION AND EVALUATION OF THE
METHOD OF THE ORDINARY-LANGUAGE
PHILOSOPHERS AND ITS DOCTRINAL BASIS**

(Publication No. 21,665)

Charles Edwin Caton, Ph.D.
University of Michigan, 1956

The purposes of this study are two: (1) to show that there is a method common to the ordinary-language philosophers and that they hold certain doctrines about language and about philosophy which form a basis for the method, and (2) to evaluate the method and the doctrines as an approach to philosophical problems.

The first part of the work (Chapters i-iii) is intended to achieve the first purpose. In Chapter i, the group in question is defined as those philosophers who characteristically show a concern with ordinary language in their work. It is shown that this definition will include men who are usually called "ordinary-language philosophers" and exclude men who are not so called. In Chapter ii, the doctrines are expounded, illustrated, and shown to be held by people in the group by quotations from their writings. The doctrines about language claim that there are expressions which are in a sense misleading, that meaning is explainable in terms of use, that ordinary language is complex in various ways, that it is important to take account of context, that the logic of ordinary language is sometimes dependent on empirical facts, and that ordinary language is correct language. There are found to be four versions of the last doctrine held: that ordinary language is (a) not contradictory, (b) necessary of (c) adequate to make any assertion, and (d) the criterion in conceptual matters.

The doctrines about philosophy claim that philosophical problems arise from a misunderstanding of ordinary language, that philosophers ought to study ordinary language, that much work of previous philosophers has been concerned with ordinary language, that philosophical problems arise from exaggerating certain features of ordinary use, and that philosophical theories often have a concealed point.

In Chapter iii, various rules of method are stated, illustrated, and shown to be held by members of the group. It is shown also that the rules are derivable from the doctrines.

The second part of the thesis is intended to accomplish the second purpose. In order to facilitate an evaluation of the doctrines in Chapter iv, certain concepts important in formulating them are clarified, following suggestions taken from the writings of the group. Then in Chapter v the doctrines are restated and further analyzed. In Chapter vi, the doctrines about language are evaluated and found to be for the most part true; the correctness doctrine, however, is shown to be false. Judgment is suspended on the doctrines about philosophy because of lack of evidence. Some frequent criticisms of the method as a whole are then examined and found to be either unwarranted or not severely damaging.

In Chapter vii, the various particular evaluations are collected in one general evaluation. It is argued that although the method and its basis form a coherent whole, the facts that judgment must be suspended on the doctrines about philosophy and that the correctness doctrine is false do not affect the group's contribution to the philosophical study of ordinary language. That is, the doctrines about language can be regarded as standing independently of the rest. 325 pages. \$4.20. Mic 57-2866

**THE NORMS OF SCIENCE. AN EVALUATION OF
THE VIEWS OF MEYERSON, DUHEM AND PEIRCE**

(Publication No. 22,046)

Leonard Charles Feldstein, Ph.D.
Columbia University, 1957

Science is treated as the enterprise of deliberating about beliefs in the light of standards expressing either goals, conditions and procedures of inquiry or special (and revocable) principles for organizing experience. Meyerson, Duhem and Peirce stress different but, when suitably emended, complementary orientations toward the content and function of these standards.

In Part I, we evaluate Meyerson's view that science alternately creates ontologies, objectifying experience as systems of immutable, homogeneous elements, and dissolves these systems, reinstating the homogeneity and fleetingness of experience. Meyerson fails to indicate whether the principles guiding this process, namely the principles of identity and transformation, formulate scientists' intentions, describe their behavior or stipulate conditions of inquiry. Nevertheless, examination of his analysis of the laws of conservation and entropy - typical instances of these principles - suggests their interpretation as expressions of the constructive role of reason in creating new objects that both organize given experience and serve as constituents of a clarified and extended experience. These objects are specified in the interplay of model and theory: the former identifies as focal for inquiry certain groups of elements in the latter, thereby making explicit its hitherto undeveloped content.

In Part II, we evaluate Duhem's view that science is an autonomous discipline, independent of metaphysics, which represents rather than explains, experimental laws by mathematical propositions derived from a few basic principles. Since, Duhem claims, all valid theories are interdependent, no hypothesis can be tested in isolation from the entire system of theories. Moreover, disparate theories (products of different types of scientific intellect) ought to be translated into a common idiom - analytic theories (whose prototype is thermodynamics). Only the latter constitute a unified, rigorous, economical and consistent language expressing ideas concordant with common sense. But a program of scientific reduction is only legitimate, we maintain, provided no special kind of theory is deemed intrinsically basic. Science advances through interplay of a plurality of theories. So long as more comprehensive theories are thereby produced, collaboration on a parity between investigators creating them is a necessary condition for scientific progress. And the principles underlying these theories are never so organically interwoven that, given suitable conventions, definitive tests may not be conducted.

In Part III, we evaluate Peirce's view that science achieves stable, dependable beliefs by a self-corrective method. This method, essentially a synthesis of techniques for solving specific problems, lays greater claim to belief than any special conclusions it generates. By disclosing increasingly comprehensive ranges of problems, it permits systematic coordination of increasingly refined beliefs. A fabric of signs, whose meanings consist in the reliable habits of action to which their acceptance leads, emerges as the cumulative product of decisions made by the scientific community in the light of norms yielded by the method. Duhem, in effect, analyzes the processes by which these signs become comprehensive. Meyerson studies the succession of transformations by which experience becomes more inclusive – the objective of inquiry designated by the signs. Peirce treats the interplay between theory and law in his account of the conversion of theoretical principles from premises constituting assertions about reality into material leading principles reflecting orientations of the scientific community toward reality.

In sum, we show that investigators establish, by scientific method (which involves appeal to certain leading ideas), theories whose principles coordinate laws that approximate the ideals of universality, accuracy and certainty; that they reduce these theories to more comprehensive theories containing a few (leading) principles; and that they construct (and discover), in this process of organizing laws and generalizing theories, the causal fabric of nature.

311 pages. \$4.00. Mic 57-2867

POSITIVISM AND REALISM IN THE EPISTEMOLOGY OF MORITZ SCHLICK

(Publication No. 21,801)

Isaac Levi, Ph.D.
Columbia University, 1957

Moritz Schlick is known to contemporary students primarily as a contributor to the activities of the Vienna Circle, the cradle of logical empiricism. However, he had contributed significantly to studies in the theory of knowledge prior to his arrival in Vienna. His best pre-Vienna work is contained in his Allgemeine Erkenntnislehre (1918) and Raum und Zeit in der gegenwärtigen Physik (1917).

The position taken in these essays differs on many issues from the views which Schlick advanced in later years and one of the major purposes of this dissertation is to examine some of these differences. Three major topics are taken up in the dissertation: Schlick's conception of the relation between truth and confirmation, his views on the relation between the meaning of a statement and the empirical evidence for it and his treatment of the mind-body problem. It is the main contention of this dissertation that Schlick's pre-Vienna position on these three questions resembles views expressed in recent years by major proponents of logical empiricism such as Rudolph Carnap and Herbert Feigl much more closely than they resemble the views which were dominant in the Vienna Circle during the height of its activity. In support of this claim, the dissertation attempts to establish the following three points:

a) Both Schlick and his colleagues in the Vienna Circle tended to identify truth with confirmation or to discard the notion of truth altogether. As a consequence, the members of the Vienna Circle were confronted with the unpleasant (at least for them) choice of admitting incorrigibly confirmable observation statements or adopting consistency or coherence as a criterion for acceptability of statements in the corpus of scientific knowledge. This consequence is avoided in Schlick's early work as well as in the recent writings of Carnap by the distinction between truth and confirmation.

b) In the earliest period of the existence of the Vienna Circle, Carnap and Schlick advanced the claim that all statements may be translated without loss of meaning into statements describing the possible evidence for them. The positivistic character of this claim runs counter to the tenor of Schlick's earlier work and the claim was subsequently abandoned by Carnap, Feigl, Hempel and other exponents of logical empiricism. Furthermore, in his pre-Vienna writings Schlick explicitly rejected any view which assigns to theoretical statements the role of rules of inference and denies them the status of genuine descriptions of reality. Herbert Feigl has developed Schlick's earlier views on this point in recent years.

c) In his Allgemeine Erkenntnislehre, Schlick was able to claim that psycho-physical reductions are at least possible and that such reductions consist of more than mere "parallelisms" between psychological and physical events. His thesis is defended at present by Feigl.

198 pages. \$2.60. Mic 57-2868

PHYSICS

PHYSICS, GENERAL

A PAIRWISE APPROACH TO THE PROBLEM OF MANY BODIES IN QUANTUM MECHANICS

(Publication No. 22,031)

John Arents, Ph.D.
Columbia University, 1957

The difficulties attendant upon the use of redundant coordinate systems are discussed, and integration is pointed out as the process in which such systems present a serious disadvantage. A coordinate system consisting of all possible vectors joining two particles is defined, with a view to variational calculations in which the Hamiltonian operator and the trial function have simple forms in terms of these vectors. A method is proposed for integrating a function expressed in such a redundant system: the integrand is written as a Fourier integral with respect to the redundant variables, the kernel is transformed to a non-redundant set, and the integration, now trivial, is performed with respect to this set, an infinite region of integration being replaced by a finite, but sufficiently large, region. There remains an integration over the variables "conjugate" to the original redundant set. Illustrating for the case of two variables subject to one condition of redundancy,

$$x_1 + x_2 = 0$$

$$\begin{aligned} G(x_1, x_2) &= (2\pi)^{-2} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} F(K_1, K_2) e^{i(K_1 x_1 + K_2 x_2)} dK_1 dK_2 \\ \int_{-\infty}^{\infty} G(x_1, x_2) dx_1 &\approx \int_{-L}^L G(x_1, x_2) dx_1 \\ &= (2\pi)^{-2} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} F(K_1, K_2) \int_{-L}^L e^{i(K_1 x_1 + K_2 x_2)} dx_1 dK_1 dK_2 \\ &= (2\pi)^{-2} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} F(K_1, K_2) \frac{2 \sin(K_1 - K_2)L}{K_1 - K_2} dK_1 dK_2 \end{aligned}$$

When $G(x_1, x_2) = G_1(x_1)G_2(x_2)$, and therefore $F(K_1, K_2) = F_1(K_1)F_2(K_2)$, this integral can be evaluated by expressing $\frac{\sin(K_1 - K_2)L}{K_1 - K_2}$ as a suitable series and integrating term by term; the series considered has the general term $a_{qr}(K_1 L)^q (K_2 L)^r e^{-\frac{1}{2}(K_1 L)^2} e^{-\frac{1}{2}(K_2 L)^2}$. The evaluation of the coefficients a_{qr} is discussed. The procedure required when G is expressed in terms of spherical coordinates is set forth, and it is shown what part of the computation needs to be performed only once for an entire class of functions. In appendices, the formulas used in finding Fourier transforms in spherical coordinates are derived; the necessary transforms and integrals involving functions of the form $G_j = x_j^q e^{-ax_j}$ are obtained; and the several inversions of limits are examined, proofs of their validity being shown except for the term-by-term integration, where only a plausibility argument can be given.

59 pages. \$2.00. Mic 57-2869

THE NORMAL LITHIUM ATOM

(Publication No. 21,030)

George H. Brigman, Ph.D.
The University of Texas, 1957

Supervisor: Professor F. A. Matsen

The principal aim of this dissertation is to describe the lithium atom in terms of orbitals and to obtain the greatest accuracy with the smallest amount of calculation, so that the best set may be used in other calculations. The secondary purpose is to consider the differences in the variational treatments on lithium and to give some reasons why one treatment should be better than another. Also, the trend of improvement in these treatments might be worth carrying further, so it is important to establish such a trend. In this dissertation, the following functions are used as variation functions:

1. The $1s^2 2s$ configuration represented by a determinantal function of hydrogenic wave functions;
2. The $1s^2 2s$ configuration represented by a product function of hydrogenic orbitals with a variable orbital exponent;
3. The $1s^2 2s$ configuration represented by a product function of hydrogenic orbitals with two variable orbital exponents;
4. The $1s^2 2s$ configuration represented by a determinantal function of hydrogenic orbitals with a variable orbital exponent;
5. The $1s^2 2s$ configuration represented by a determinantal function of hydrogenic orbitals with two variable orbital exponents;
6. The $1s^2 2s$ configuration represented by a determinantal function of Slater orbitals with two variable orbital exponents;
7. A linear combination of the configurations $1s^2 2s$, $1s2s^2$, $1s2p^2$, and $2s2p^2$, each represented by a determinantal function of Slater orbitals with two different variable orbital exponents;
8. The open configuration $1s1s'2s$ represented by a linear combination of two determinantal functions of Slater orbitals with three variable orbital exponents; and
9. The open configuration $1s1s'1s''$ represented by a linear combination of two determinantal functions of Slater orbitals with three variable orbital exponents.

152 pages. \$2.00. Mic 57-2870

DIFFUSION IN LEAD TELLURIDE

(Publication No. 21,907)

Frederick Eli Card, Ph.D.
Syracuse University, 1957

Diffusion in semi-conductors can be measured by the movement of a p-n junction as the concentration of a donor or acceptor changes. A small concentration change gives a large effect on the electrical conductivity and permits diffusion to be observed at low concentrations. This method has been applied to diffusion in Ge and the results are in good agreement with those obtained by tracer measurements.

However, the p-n junction method applied to PbS gave a diffusion rate several orders of magnitude larger than earlier tracer results. PbS is a compound semi-conductor, as compared to Ge which is an elemental semi-conductor, and this suggests the possibility of the two methods giving different results for a compound semi-conductor while giving the same results for an elemental semi-conductor. This investigation of diffusion in PbTe was undertaken to answer this question as well as to provide more knowledge of PbTe properties. Since PbTe is a compound semi-conductor and the same material can be used for each method, the results give more evidence on whether or not this difference between elemental and compound semi-conductors always exists.

A film of Pb, with a small part of Pb^{210} for use as a tracer, was evaporated onto a single crystal PbTe specimen. After heating, the specimens were sectioned with a specially designed grinder. The grinding of sections, instead of cutting on a lathe, permitted use of low concentrations of Pb even though a relatively low radioactive concentration was used. Also, since PbTe is brittle and chips readily, sectioning on a lathe would have been extremely difficult. The activity change with depth gives the diffusion rate at that temperature. At 500°C the diffusion rate is $1.3 \times 10^{-11} \text{ cm}^2/\text{sec}$ and the variation with temperature is given by

$$D = .03 \exp (-34,800/RT) \text{ cm}^2/\text{sec}.$$

Diffusion was measured over temperatures ranging from 310°C to 817°C . The activation energy is $34,800 \pm 2000 \text{ cal/mol}$.

The diffusion rate was also measured by the penetration depth of a p-n junction. The junction, created by Pb diffusing into p-type PbTe, was located with a thermoelectric probe. The first attempts failed because of high oxygen impurity concentration. A modified method of growing PbTe crystals was developed to give a sufficiently low oxygen concentration. The measurements were made on these specially grown crystals and the results were in fair agreement with the tracer results. Considering the lower precision of the p-n junction measurements, the two methods were concluded to agree and to be a measure of the rate of diffusion of Pb in PbTe.

From the experiences of applying and comparing the two methods for PbTe, it was concluded that, unless considerable care is taken, the p-n junction method might indicate a much higher diffusion rate than the tracer method. Oxygen, or other impurities, can change the conductivity type as it diffuses and the results will be of a combination of oxygen and metallic diffusion. When this happens, the results will vary erratically from one run to the next.

Earlier work on diffusion in PbS could have been affected similarly. This would account for the disagreement between tracer and p-n junction diffusion rates in PbS.

82 pages. \$2.00. Mic 57-2871

MESON PRODUCTION IN
NUCLEON-NUCLEON COLLISIONS

(Publication No. 22,045)

Gerald Feinberg, Ph.D.
Columbia University, 1957

The production of mesons in collisions between nucleons at energies in the neighborhood of 1 Bev. have been calculated through a model proposed by Henley and Lee. The nucleon is taken to consist of an extended core characterized by spin, isotopic spin and velocity, and of a cloud of mesons interacting with the core. The collision process is described by a matrix which depends only on the core variables of the two nucleons, this being a sudden approximation. The probabilities for the production of different numbers of mesons are obtained by expanding the core cloud system as modified by the collision in a complete set of states containing two nucleons and free mesons of various numbers and types.

The wave function for the single nucleon, (core-cloud system) is calculated by the intermediate coupling method applied to an approximate Hamiltonian for the interaction of mesons with a moving core. It is shown that the results obtained this way are the same as those obtained by a Lorentz transformation of the wave function for mesons interacting with a fixed core. The wave functions for nucleons and several mesons are obtained similarly, with the additional approximations of neglecting multiple scattering of one meson by different nucleons and the scattering of two mesons by the same nucleon.

The wave functions are found to have the property that appreciable meson production is likely to occur only when one meson and a nucleon are in a state with total isotopic spin $3/2$ and total angular momentum $3/2$, in agreement with a suggestion made by Peaslee. This feature makes it possible to retain only those terms in the collision matrix which can excite these states. These terms are determined up to one parameter, upon which most quantities of interest depend only slightly.

The kinematic features of the production process at 800 Mev and 1.5 Bev such as momentum distributions, angular distributions and Q values are found to be in fair agreement with the experimental results. The ratios of single to double meson production found here are 4-5 times higher than those obtained experimentally at these energies, while the distribution of charges of the mesons is consistent with the experiments within their uncertainties.

The interpretation of these results in terms of the validity of this model is discussed.

65 pages. \$2.00. Mic 57-2872

THE SPIN AND QUADRUPOLE MOMENT OF I^{125} AND THE MAGNETIC MOMENT OF I^{131}

(Publication No. 21,784)

Paul C. Fletcher, Ph.D.
Columbia University, 1957

The spin and quadrupole moment of I^{125} have been determined by observations on the microwave absorption spectrum of $\text{CH}_3\text{I}^{125}$. Five absorption lines have been observed which fit the quadrupole hyperfine pattern of the $J=2 \leftarrow 1$ rotational spectrum. The measurements indicate a spin of $5/2$ and a quadrupole coupling constant of -2179 ± 1 Mc/sec. Using this and other known properties of the CH_3I molecule, the quadrupole moment of I^{125} is calculated to be $-.66 \times 10^{-24} \text{ cm}^2$. This spin and quadrupole moment suggest a nuclear configuration for I^{125} similar to that of stable I^{127} , i.e. predominantly $d_{5/2}$. The magnetic moment of I^{131} has been measured by observation of the Zeeman splitting of the $F=9/2 \leftarrow 9/2$ ($K=1$) hyperfine line of the $J=2 \leftarrow 1$ rotational spectrum of $\text{CH}_3\text{I}^{131}$. The magnetic moment is found to be $2.56 \pm .12$ nuclear magnetons. The observations also confirm the previous results of Gordy et al. for the spin of I^{131} of $7/2$ and quadrupole coupling constant, $eqQ = -974 \pm 1$ Mc/sec. The magnetic moment measurement suggests a ground state configuration similar to that of I^{129} of predominantly $g_{7/2}$ in nature but with large admixture of other states. The significance of these results are discussed.

34 pages. \$2.00. Mic 57-2873

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THERMAL CAPTURE OF ELECTRONS IN SILICON

(Publication No. 21,913)

Hermann Karl Gummel, Ph.D.
Syracuse University, 1957

A theory for thermal transition probabilities of an electron trapped in a semiconductor is developed and applied to capture of electrons by donors in Si.

The calculation is done in the Born-Oppenheimer approximation, considering only linear terms in the lattice variables for the perturbing operator and the electronic energy. An expansion of the transition probability in terms of the number of participating phonons is given. If only one-phonon processes are important, then the Born-Oppenheimer approximation gives the same result that would be obtained using the Born-Hartree approximation.

For electrons in Si the form of the wave functions corresponding to the six-valley conduction band allows intervalley transitions as well as intravalley transitions. If the band minima are located at $4.5/\ell$ (ℓ = silicon cube length) then far-valley umklapp processes are important and we obtain for the cross section for capture of a free electron directly into the ground state of phosphorus impurity, at liquid helium temperatures, a value of order 10^{-12} cm^2 to $7 \times 10^{-14} \text{ cm}^2$.

78 pages. \$2.00. Mic 57-2874

COORDINATE CONDITIONS AND TRUE OBSERVABLES

(Publication No. 21,915)

Allen Ira Janis, Ph.D.
Syracuse University, 1957

This paper treats the relationship of coordinate conditions to the problem of finding the true observables in general relativity. The true observables, which are the coordinate-invariant quantities, are to be found within the framework of the classical theory as a preliminary to quantization. It is shown that if the Lagrangian is modified by the use of coordinate conditions, in analogy to Fermi's treatment of electromagnetic theory, it is possible to identify a transformation group whose generators serve to define the true observables and their commutation relations. These generators are those constants of the motion for the modified Lagrangian which generate transformations preserving the coordinate conditions. However, this treatment does not lead to a method for constructing these generators.

27 pages. \$2.00. Mic 57-2875

LATTICE VIBRATIONS IN SODIUM CHLORIDE TYPE STRUCTURES

(Publication No. 21,532)

Paul Mazur, Ph.D.
University of Maryland, 1957

Supervisor: Professor Elliott W. Montroll

Three problems in the theory of lattice vibrations in sodium chloride type lattices are investigated and quantitative treatments are carried out in detail.

Firstly, assuming only nearest neighbor interactions with central and non-central forces, the frequency spectrum (i.e., the number of normal modes of vibration between ω^2 and $\omega^2 + \Delta\omega^2$) is obtained exactly. The effect of 2nd nearest neighbor interactions on the spectrum is then treated as a small perturbation.

Secondly, assuming only nearest neighbor interactions, the distribution function of the position of a typical atom around its equilibrium position is worked out. Analytic expressions for the dispersion are obtained as a function of temperature, central and non-central force constants, M (the heavier mass component), and m (the lighter mass component).

Thirdly, the effect of defects on the lattice vibration is investigated. Depending on the type of defect introduced one finds localized modes emerging from either the acoustic band or the optical band or both. The self-energy of one isotope defect and the interaction energy between two isotope defects is obtained only for a one dimensional diatomic chain. The localized modes arising in the case of a three dimensional diatomic lattice (sodium chloride type) are examined only qualitatively from the Green's Function for the problem.

131 pages. \$2.00. Mic 57-2876

ON THE VALIDITY OF THE ASSUMPTION OF TWO-BODY INTERACTIONS IN MOLECULAR PHYSICS

(Publication No. 21,530)

Rosemary Thorndike McGinnies, Ph.D.
University of Maryland, 1957

Supervisor: Dr. Laurens Jansen

A review is given of the importance of many-body forces in molecular physics with particular reference to three-body interactions between atoms or molecules originally in their ground states. Although liquids and molecular crystals are held together by van der Waals forces, which are of second order, no many-body forces of this type have so far been studied (except for those between nonspherical molecules). The characteristics of three-body forces of this type are illustrated if at least two of a triplet of atoms which are close together are represented by an antisymmetric wave function. Such configurations seem to be important for the stability of the crystal structure of the rare gases. An explanation of the observed cubic crystal structure of the heavy rare gases in terms of two-body forces can be eliminated on the basis of previous research; first and third order perturbation theory give forces of insufficient size and range to explain the problem.

In this thesis the three-body component of the second-order energy of interaction between atoms in a triangle is evaluated for three hydrogen atoms with parallel spins and for three helium atoms. Two of the atoms (AB), which are nearest neighbors in the crystal, are represented by an antisymmetric zero-order wave function. It is found that in general the attractive forces between (AB) and the third atom C are weaker than when calculated as a sum over isolated pairs (AC) and (BC). Numerical results are given for three special cases: a linear array, a right triangle, and an integrated effect, as functions of the distances between the three atoms. They are usually considerably larger than the third-order dipole energy for the same triangular configuration.

The calculations are extended to the heavy rare gases by using a Gaussian distribution function for the electronic charges in the atoms. This is possible because a detailed calculation for neon using Hartree-Fock wave functions shows that double interatomic and coupled interatomic and intra-atomic exchanges of electrons between neon atoms may be neglected compared with the single interatomic exchange contribution. Then equations for the three-body interactions for the heavy atoms become formally the same as those for three hydrogen atoms. Expressions for the induced dipole-dipole and dipole-quadrupole components of the field are summed over a finite portion of the cubic and hexagonal close-packed lattices to determine which is more stable at absolute zero temperature (excluding zero-point energy); it is found that the cubic is favored over the hexagonal by about one-tenth of one per cent of the van der Waals cohesive energy, if the first and second shells of neighbors are excluded from the region of summation for the third atom. If this restriction is dropped, then the difference between the two structures vanishes, while the effect itself increases sharply. Under this restriction, the magnitude of three-body interactions is twenty per cent of the van der Waals cohesive energy for xenon. Three-body forces in second-order perturbation theory may increase

the difference in lattice energy between the two crystal structures by an order of magnitude compared with that based on the assumption of two-body forces.

101 pages. \$2.00. Mic 57-2877

THE VALIDITY OF TOMONAGA'S METHOD OF INTERMEDIATE COUPLING

(Publication No. 21,535)

Charles Alfred Roberts, Jr., Ph.D.
University of Maryland, 1957

Supervisor: Dr. James L. Anderson

The validity of Tomonaga's method of intermediate coupling has been investigated for the case of fixed source meson theories. Tomonaga's method was applied to a field theoretic Hamiltonian that has been proposed and solved exactly by G. Wentzel.

A discussion is given of the various approximation schemes used in field theory and their relation to the Tomonaga method. The self energy of Wentzel's pair theory is solved for values of the coupling constant ranging between zero and infinity. A justification for the trial function and an interpretation of it is given.

The probability amplitudes for the various number of mesons has been calculated as a function of coupling constant. Wentzel's exact solution for the self energy is compared with the results of the Tomonaga method.

Tomonaga's method agrees exactly with the weak coupling and strong coupling result of Wentzel's solution. The error for intermediate coupling is found to be not greater than 20%. No approximation is made other than Tomonaga's.

71 pages. \$2.00. Mic 57-2878

MANY-VALLEY THEORY OF FREE-CARRIER ABSORPTION IN N-TYPE GERMANIUM

(Publication No. 21,927)

Robert Rosenberg, Ph.D.
Syracuse University, 1957

There are two parts to the present work. Part One is a theory of the cross-section for infrared absorption by electrons in the lowest conduction band of germanium. The band is given its well-known many-valley structure, and the resulting complications are treated in detail. The cross-section is calculated in second order Born approximation which provides the simplest formulation of the "three-particle" nature of free-carrier absorption:- Since the carrier absorption spectrum is that of a damped harmonic oscillator of resonant frequency zero (no restoring force on electron), the initial and final electronic states must belong to the same band (if the band is isolated from other bands). This requirement is incompatible with photon absorption by an electron in a perfect lattice. A third particle, some lattice imperfection, must scatter the electron to permit the entire process to conserve energy and momentum.

The lattice imperfection treated in greatest detail is the phonon. When the electron lies in a many-valley conduction band, phonons belonging to all six branches of the vibrational spectrum contribute to both intra-valley and inter-valley electron transitions. (Electron-phonon scattering matrix elements are worked out in Part Two.) It is found that in the experimentally significant ranges $T \gtrsim 300^\circ\text{K}$, $10\mu \lesssim \lambda \lesssim 40\mu$ where phonon processes dominate the cross-section, all phonon contributions are indistinguishable on a temperature or wavelength basis. This result, in combination with the scalar character of the relaxation time in N-type germanium, is used to explain why theories which have appeared while this paper was in preparation can be made to yield observed high temperature cross-sections in spite of an overly simplified approach. The cross-section for phonon processes is shown to agree with experiment at 450°K , where competing processes are not significant. The agreement is obtained without arbitrarily adjustable parameters. Reasonable values of deformation parameters have been taken from the literature.

Contributions to the cross-section made by ionized impurity scattering processes are calculated by treating the scatterers as screened Coulomb potentials. On this model, the cross-section can be calculated as though only intra-valley processes occur. Comparison with experiment at 78°K , where the ionized impurity contribution should be dominant, shows that the calculated cross-sections are several times too small.

Part Two is a general theory of phonon - one-electron interactions in non-polar semiconductors. The principle features of the theory are:- (a) The interaction potential is required to be linear in the displacements of lattice particles from their equilibrium positions; it must also satisfy invariance requirements of crystal symmetry. (b) Matrix elements of the interaction potential are expanded in series in the displacements of initial and final electron propagation vectors from the nearest respective minima in the Brillouin zone; the coefficients are matrix elements (deformation parameters) which must satisfy invariance requirements of crystal symmetry.

The most noteworthy results are:- (i) To first approximation, matrix elements have been obtained for the interaction of an electron with any phonon. (ii) In N-type germanium, one deformation parameter for long wavelength acoustic modes is a function of the polarization of the mode. Each transport property which is calculated with the full "deformation potential" therefore weights the deformation constants in a distinct way. (iii) In N-type silicon, the coefficients of both the zero-order and first-order terms in the series expansion of the matrix element for long wavelength optical modes vanish. The marked deviation of lattice mobility from a $T^{-3/2}$ law is thus almost certainly due to inter-valley processes.

248 pages. \$3.20. Mic 57-2879

THE ROTATIONAL MAGNETIC MOMENTS OF Li^6F AND Li^7F

(Publication No. 21,928)

Allan Melvin Russell, Ph.D.
Syracuse University, 1957

The experimental measurement of the rotational magnetic moments of Li^6F and Li^7F using a molecular beam electric resonance radiofrequency spectrometer is described. Some theoretical considerations are advanced to explain the results of these measurements.

The expression for the magnetic moment due to moving charges is derived. This expression is used in conjunction with an ion-pair model to give a formula for the rotational magnetic moment in an ionic diatomic molecule. The formula may be written as follows,

$$\frac{\mu_J}{J} = \frac{1}{m_+} - \frac{1}{m_-} \quad \text{nuclear magnetons per J,}$$

where m_+ is the mass of the positive ion in atomic mass units

and m_- is the mass of the negative ion in atomic mass units.

A theory of the electronic contribution to μ_J is formulated which treats the electron distribution as a classical charge cloud. This theory relates the rotational magnetic moment to H_n , the magnetic field at a nucleus arising from molecular rotation. It appears that the electronic contribution to H_n is the same as the non-slip electronic contribution to μ_J needed to correct the ion-pair approximation.

The theory of the operation of the molecular beam electric resonance spectrometer is explained. The experimental arrangement used to determine μ_J with this apparatus is described. Predicted and observed spectra are analyzed and the rotational magnetic moments of the molecules are given;

$$\left(\frac{\mu_J}{J}\right)_{\text{Li}^6\text{F}} = 0.0818^{+0.0005}_{-0.0003} \text{ nuclear magnetons per J,}$$

$$\text{and } \left(\frac{\mu_J}{J}\right)_{\text{Li}^7\text{F}} = 0.0642^{+0.0004}_{-0.0002} \text{ nuclear magnetons per J.}$$

These results are shown to be within ten percent of the predicted values based on the ion-pair model as corrected for the non-slip electronic contribution. The latter is determined from previously measured values of H_n in these molecules.

Since the sign of the moments could not be measured in the experiments, the sign of the electric dipole moment could not be obtained from a comparison of the results for the two isotopes.

62 pages. \$2.00. Mic 57-2880

A NUMERICAL CALCULATION OF THE WAVE FUNCTIONS AND ENERGIES OF THE 1^1S AND 2^3S STATES OF HELIUM

(Publication No. 21,830)

Daniel H. Tycko, Ph.D.
Columbia University, 1957

An iteration method for obtaining solutions to the eigenvalue problems of quantum mechanics is used as the basis for developing a numerical iteration scheme for the approximate solution of such problems. The connection between an approximate analytic iteration method and the standard variational method is made explicit and this method is applied to the 1^1S state of He. The wave functions so determined are linear combinations of products of hydrogen-like wave functions. The best value of the energy obtained with twenty parameters is $E(1^1S) = -2.900938$ (atomic units). Using the theory of Gaussian quadrature and least squares approximation a systematic transition from the exact iteration method to the numerical iteration method is made. The resulting numerical scheme is applied to the 1^1S and 2^3S states of He. A brief description of the program written for the Navel Ordnance Research Calculator (NORC) is given. The energies obtained are $E(1^1S) = -2.9034\ 42635$ and $E(2^3S) = -2.1748\ 22905$. The results are compared to experiment and to theoretical results calculated by other methods. Possible improvements in the method are discussed.

96 pages. \$2.00. Mic 57-2881

PHYSICS, ELECTRONICS AND ELECTRICITY

MATHEMATICAL DEVELOPMENTS APPLICABLE TO THE EFFECT OF FILTERS, LIMITERS, RECTIFIERS, AND DEMODULATORS ON PHASE MODULATION

(Publication No. 21,029)

Harry John Auvermann, Ph.D.
The University of Texas, 1957

Supervisor: Professor C. W. Horton

This paper is pointed toward the development of useful mathematical results in the field. Rectifiers, limiters, demodulators and filters are treated in turn after a review of the work in the literature. Convergent series expressions are developed for the effect of limiters and rectifiers on phase-modulated signals in the presence of noise. The concept of synthetic demodulation is developed which is suitable to exact analysis. The demodulated signal is presented as a series of components at the modulating frequency and again as a series of multiples of the carrier frequency. Results of tests on a synthetic demodulation system are presented showing the effect of demodulation when a high modulation index and a high modulating frequency are employed. A new development connected with the expression of the phase-modulated signal as the series

with Bessel coefficients is presented. This development is carried forward to obtain the Fourier spectrum of the amplitude modulation produced by a filter. The coefficients of the components of this spectrum are expressed in series form. Curves are plotted showing the deviation from the quasi-stationary solution.

100 pages. \$2.00. Mic 57-2882

THE DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF AEROSOLS BY PRECIPITATION OF CHARGED PARTICLES

(Publication No. 21,782)

Vadim George Drozin, Ph.D.
Columbia University, 1957

Existing methods for the determination of particle size distribution in an aerosol sample are based on counting the numbers and measuring the sizes, or some effects connected with size, of individual particles. This is a tedious and time-consuming procedure when reasonably high accuracy is required. When the particle size distribution changes more or less rapidly, the processes cannot be investigated because of the relatively long time required for its determination.

This dissertation is concerned with the investigation of methods for the determination of particle size distribution based on measuring macroscopic properties of a large number of particles. The electric current carried by a large number ($\sim 10^8$) of particles charged in a corona discharge and precipitated in an electric field, when measured as a function of precipitation time, is one such property. It was found that the number of charges acquired by particles is a single-valued function of particle size. From the knowledge of this function and measured values of current (or accumulated charges) versus time, the size distribution curve can be determined. The entire procedure, including the necessary calculation, takes about twenty minutes, and requires relatively nonexpensive equipment. All experiments were carried out with particles in the sub-micron range, the most difficult and at present the most important range for the determination of particle size distribution.

Three methods were developed theoretically. They are based on the precipitation of charged particles in 1) a gravitational, 2) a centrifugal, and 3) an electrostatic field. The size distribution of aerosol particles in a sample was successfully determined by the third method, which was developed and checked experimentally.

The size distribution of particles of 0.2μ radius and smaller could not be determined by the third method, since their charging follows another law. Theoretically it is possible to overcome this difficulty, but further investigation will be needed.

72 pages. \$2.00. Mic 57-2883

MEASUREMENT AND INTERPRETATION
OF POTENTIAL DISTRIBUTIONS IN
PHOTOCONDUCTIVE CdS

(Publication No. 21,863)

Robert Frank Miller, Ph.D.
The University of Wisconsin, 1957

Supervisor: Associate Professor R. C. Retherford

An account is given of an investigation of electrical conduction in CdS crystals with specific contacting materials. In the first part of this research the effects of six electrode materials and the effects of crystal surface preparation at the contacts are evaluated by means of observing their influence on the volt-ampere characteristics of the crystal and on the behavior of the potential distribution along the crystal. In the second part a more elaborate potential probing technique is described, and the results obtained thereby are compared with the predictions of a theory of small currents in insulating crystals.

It is found that indium-indium and gallium-gallium electrode pairs make the best electrical contacts as characterized by non-rectifying properties, low noise behavior, and the passage of larger currents than those observed for other materials. Silver-indium and silver-gallium pairs, on the other hand, generally form a rectifying set of contacts. Diodes made with such contacts show enhanced rectifying properties when the anode (silver contact) surface is polished and show reduced rectifying properties when the surface is roughened as by chemical etching.

The potential profiles obtained by probing the crystal appear to indicate that even the better contacting materials tend to introduce a nonlinear potential distribution into the crystal originating at the contacts. Results obtained by the refined probing techniques further substantiate the existence of these nonlinear regions and show that they are of two types. In the case of silver doped crystals the contact may be of a charge carrier enriched type involving low fields in that region, whereas for more conducting gallium doped crystals the contact behaves like a depleted carrier type with high fields in its vicinity.

A theory, developed to explain the nonlinear potential distributions, is found to be in semi-quantitative agreement for the cathode region of the enriched case. It is, however, unsuccessful in explaining the performance of both of the contacts. Calculations of electron mobility, corrected for electron trapping, have been made for the silver doped crystal by means of this theory, and are found to be in reasonable agreement with published values.

The results of this work clearly indicate that contact materials and surface preparation can influence the electrical properties of the crystal and the potential distribution within the crystal. Although, further improvements are needed in the theory and in experimental matters, it appears that potential probing is a promising method of studying electrical conduction properties in insulating photoconductors.

87 pages. \$2.00. Mic 57-2884

PHYSICS, NUCLEAR

THE ELECTRON SPECTRA OF Cs^{134} AND Ba^{131}

(Publication No. 21,979)

Leon Stanley August, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Max Goodrich

A double-focusing, iron core magnetic spectrometer employing a scintillation detector was constructed, tested, and used to study the electron spectra of Cs^{134} and Ba^{131} .

The performance of the spectrometer was shown to be satisfactory by studies that were made on the Cs^{137} electron spectrum. This spectrum has been thoroughly investigated by a number of other workers. The spectrum obtained for the principal beta component of Cs^{137} showed a unique first-forbidden shape and had a maximum energy of 511 ± 20 kev. The $K/(L+M)$ ratio of the 661 kev transition in Ba^{137} was found to be 4.5 ± 0.5 . These results are in good agreement with the generally accepted data on this radioisotope.

The method employed in determining conversion coefficients involved using the 661 kev, M4 transition in Ba^{137} as a standard of comparison. The theoretical value of the K-conversion coefficient for this transition was used in determining other conversion coefficients. Other workers have shown that the theoretical and experimental values for this K-conversion coefficient agree to within the experimental error. The required gamma-ray intensities were determined with a scintillation spectrometer. The method was shown to be satisfactory by determining the K-conversion coefficients of the 605 kev and 797 transitions in Ba^{134} . The K-conversion coefficient for the 605 kev transition was found to be $(5.8 \pm 0.6) \times 10^{-3}$ while that of the 797 kev transition was $(2.8 \pm 0.3) \times 10^{-3}$. These values are in reasonable agreement with those of other investigators who used different methods that seem reliable.

In the course of working with Cs^{134} a beta-spectrum was observed which had not been previously reported. A Fermi plot of the data gives a maximum energy of 0.95 ± 0.15 Mev for this spectrum.

The work on Ba^{131} was performed using a specially prepared source of relatively high specific activity. The conversion electron spectrum confirmed the existence of a 133 kev transition in Cs^{131} . This transition had been reported in only one previous investigation. All of the principal transitions in Cs^{131} were observed as well as the three highest energy ones whose energies are 830, 915 and 1040 kev. Previously these highest energy transitions had only been observed with a scintillation spectrometer. There was also evidence of other weaker transitions whose energies were found to be 94, 158 and 405 kev. The two lowest energy transitions reported by several investigators could not be confirmed because of detector cut-off at these low energies. The K-conversion coefficients of the principal transitions and the three weak, high energy ones were determined. From these data probable multipolarities are given. These conclusions were verified when possible by the K/L or $K/(L+M)$ ratios for these transitions. The values for the conversion coefficients and the K/L or the $K/(L+M)$ ratios indicate that each transition studied in Cs^{131} is one of the following types: E1, E2, M1 or E2 + M1. The information on multipolarities has been used in

proposing an improved and more complete decay scheme by other workers in this laboratory who have done other experiments on Ba^{131} . 99 pages. \$2.00. Mic 57-2885

**DEVIATIONS FROM A PURE S-WAVE
ANOMALY IN THE PROTON-PROTON
SCATTERING CROSS SECTIONS
BETWEEN 1.4 AND 2.1 MEV**

(Publication No. 21,844)

Edgar Davis Berners, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Raymond Herb

The differential cross section for scattering of protons by protons has been measured at incident proton energies of 1397, 1598 and 2101 kev in an attempt to confirm the p-wave anomaly reported by Worthington, McGruer and Findley and predicted by Eriksen, Foldy and Rarita. Systematic errors caused by target contamination, slit-edge scattering, counter behavior and geometrical effects were studied in great detail. The uncertainties arising from each of these effects and from the statistics of counting were reduced to the order of 0.1%. The large scattering chamber of Worthington, McGruer and Findley was used in modified form, with substantial improvements in experimental technique. The present data at 1855 kev are essentially in agreement with the previous result that the observed scattering cannot be described by an s-wave phase shift alone. However, at each energy the data contain serious inconsistencies which are shown to cast doubt on the existence of a measurable p-wave effect, both in the present work and in the previous measurements at 1855 kev.

95 pages. \$2.00. Mic 57-2886

A DECAY SCHEME FOR Ba^{131}

(Publication No. 21,985)

Robert Wilfred Campbell, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Max Goodrich

The decay of the electron capture isotope Ba^{131} has been investigated by NaI scintillation spectrometers. Both single channel and gamma-gamma coincidence spectra have been obtained. Sixteen gamma-rays were observed having energies 60, 90, 123.8, 160, 215.8, 240, 250, 373.5, 405, 497.5, 588, 620, 705, 824, 918, 1039 kev. The energies determined by Cork et. al.¹⁰ for the four prominent gamma-rays (123.8, 215.8, 373.5, and 497.5 kev) were used for calibration. Internal conversion coefficients from magnetic spectrometer measurements*, relative gamma-ray intensities determined by using a 3" NaI crystal, and coincidence measurements were combined to produce an improved decay scheme. 60 pages. \$2.00. Mic 57-2887

*Leon S. August, private communication.

**FISSION FRAGMENT STUDIES BY
MAGNETIC ANALYSIS**

(Publication No. 21,893)

Clyde Benson Fulmer, Ph.D.
North Carolina State College, 1957

Supervisors: Raymond L. Murray and Bernard L. Cohen

A high resolution magnetic spectrograph was used to make the following studies of the properties of fission fragments from U^{235} .

1. Equilibrium charges of the median light and heavy fission fragments were found to vary linearly with velocity within 2% in H_2 , He, and air and within 5% in argon. By a mass identification method, the equilibrium charge mass-97 fission fragments was also studied and found to vary linearly with velocity. The maximum pressure effect increases the equilibrium charge of the light and heavy fragments 17% and 11%, respectively. From measurements of the magnetic rigidity of the light fragments in air, A, H_2 , and He, as a function of (pressure x velocity) the mean radiative lifetime of excited ionized fission fragments was found to be 1.6×10^{-11} second.

2. The scintillation response of CsI(Tl) crystals to fission fragments was found to be approximately linear with fragment energy. The pulse heights for both groups of fragments are larger than for 5.3-Mev alpha particles. Energy resolution is adequate to resolve the two groups of fragments. The specific fluorescence of the crystal for fission fragments was more than twice that for 5-Mev alpha particles; it increases monotonically with specific energy loss.

3. Energy vs range data were obtained for the median light and heavy fission fragments in H_2 , He, air, A, Al, Au, and nickel. In each case the specific energy loss was found to decrease along the range. The ranges increase monotonically with atomic number of the stopping material.

4. The energy distribution of the long range alpha particles from pile neutron fission of U^{235} was determined by high resolution magnetic analysis. The distribution is approximately symmetrical with the peak at 15 Mev. The distribution extends to 26.5 Mev. No fine structure was observed in the energy distribution. The shape of the distribution shows that the long range particles are formed at the instant of fission rather than being emitted from a compound nucleus.

5. The optimum performance of a magnetic fission-fragment mass separator was achieved with He gas filling the deflection chamber to a pressure of 20 mm Hg. The best attainable resolution is 3.3% for mass-91 or -97 fragments, of which 2.2% is due to nuclear charge distribution of fission fragments of a given mass. Equilibrium charge as a function of atomic number was investigated. The full width at one-half maximum of the nuclear charge distribution of fission fragments of a given mass was found to be 2.0 ± 0.6 .

97 pages. \$2.00. Mic 57-2888

ELASTIC SCATTERING OF ALPHA-PARTICLES BY CARBON-14

(Publication No. 21,869)

James Adolf Weinman, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Hugh T. Richards

The elastic scattering of alpha-particles by C^{14} has been observed for alpha energies between 2.0 and 3.9 Mev and for $\Theta_{c.m.} = 169^\circ, 149.5^\circ, 140.8^\circ, 125.3^\circ$, and 90° . The solid targets of 38.6% C^{14} were at least 8 kev thick.

Energies of both the incident and scattered particles were measured with cylindrical electrostatic analyzers. The off-resonance cross sections were normalized to those derived from dispersion theory. By applying dispersion theory to information derived from the $C^{14}(\alpha, \alpha)C^{14}$ and $C^{14}(\alpha, n)O^{17}$ reactions the resonance energies, angular momenta, parities, and reduced widths of several O^{18} levels were obtained. The levels of O^{18} considered had the following resonant energies, parities, and J values: 8.051 Mev (O^+ or 1^-), 8.222 Mev (2^+), 8.293 Mev (3^-), 8.412 Mev ($O^+?$), 8.830 Mev (O^+), 8.966 Mev (1^-), and 9.0 to 9.2 Mev two levels, either (3^- and 2^+) or (3^- and 4^+).

53 pages. \$2.00. Mic 57-2889

PHYSIOLOGY

RESPIRATORY NEURONAL ACTIVITY IN THE PONS OF THE CAT

(Publication No. 22,039)

Morton I. Cohen, Ph.D.
Columbia University, 1957

In a series of vagotomized cats the pons was explored with microelectrodes for neuronal activity synchronous with phases of respiration. The animals were maintained on nitrous oxide-oxygen anesthesia with 2% CO_2 in the gas mixture. Action potentials and chest movements were recorded with a dual beam oscilloscope. 275 spontaneous neuronal discharges synchronous with respiration were recorded at all levels of the pons. Four types of neurons were found: a) neurons which fire only during inspiration or whose firing frequency increases during inspiration; b) neurons which commence firing during inspiration, and which cease firing during expiration; c) neurons which fire only during the expiratory phase; d) neurons which commence firing during expiration, and which cease firing during inspiration. The inspiratory neurons (a) were found predominantly in the dorsolateral portion of the rostral pons: the same region where the "pneumotaxic mechanism" has been located on the basis of destruction and stimulation experiments. In other regions of the pons the most frequent type of discharge was "inspiratory-expiratory" (b). A hypothesis of pontile respiratory function is proposed: the pontile neurons function to modulate the medullary respiratory mechanisms. The expiratory and inspiratory-expiratory neurons (c and b) are believed to promote expiration; the inspiratory and expiratory-inspiratory neurons (a and d) are believed to promote inspiration.

To determine if the pneumotaxic mechanism is inherently periodic, microelectrode explorations were made in the pneumotaxic region after isolation of half the pons (by sectioning procedures) from the remainder of the brain. In the pneumotaxic region of the isolated hemi-pons, no periodic discharges resembling respiratory discharges were found. It is therefore concluded that the respiratory neuronal activity in the region is dependent on connections with the medulla.

83 pages. \$2.00. Mic 57-2890

OSMOTIC AND METABOLIC STUDIES ON MITOCHONDRIA ISOLATED FROM ACANTHAMOEBA SP.

(Publication No. 22,017)

Richard L. Klein, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Robert J. Neff

The osmotic and metabolic properties of *Acanthamoeba* sp. mitochondria were shown to parallel closely those of mammalian mitochondria. The particles were of comparable size and shape. Isolation and purification was done in 0.25M sucrose plus 0.01M versene. Aging inhibited enzymatic activity and affected osmotic properties at room temperature. The utilization of substrates, the effect of cofactors and inhibitors, and the effect of various osmotic conditions were investigated. Percentage weights, volume, and water content of the mitochondria were compared to the whole cell. Active osmotic volume was calculated.

A method for measuring mitochondrial volume by the use of modified hematocrit tubes was described. Hematocrit volumes were compared with those determined by the optical density method (Raaflaub 1952, Cleland 1952) in a large variety of suspending media. The optical density method was found to be unreliable with *Acanthamoeba* mitochondria except in plain KCl solution. A critique on this method along with a discussion of light scattering phenomena was presented. It is suggested that interpretations of mitochondrial volume changes based on the optical density method are very dubious in many cases depending on the experimental conditions, and that the method is unreliable for particles of mitochondrial size and nature.

Acanthamoeba mitochondria behave as true osmometers in plain sucrose or KCl solutions. Mixtures of non-electrolytes and electrolytes and the addition of particular ions or chelating agents cause radical deviations from the expected osmotic behavior in most cases. A complex relationship of ion exchange and balance with mitochondrial membrane properties was demonstrated. Calcium ions were particularly important causative agents of mitochondrial shrinking, clumping and inactivity. Magnesium

functioned primarily as a cofactor and stimulated enzymatic activity. Phosphate stimulated aerobic respiration to a much lesser degree. Sucrose protected mitochondrial integrity. Sucrose was shown to enter the particles slowly under certain experimental conditions.

The surface of *Acanthamoeba* mitochondria appeared to be primarily protein in nature. Trypsin was deleterious at high concentrations; lower concentrations stimulated aerobic respiration. Crude lipase had little effect on aerobic respiration.

Acanthamoeba mitochondria are acidic, but they cause an alkaline reaction in the suspending medium proportional to oxygen uptake. Ammonia is produced by these particles to a greater degree in exogenous than in endogenous respiration, but this only accounts for a small part of the alkaline reaction. Increases in pH, due to substrate oxidation, of up to 1.0 pH unit were shown despite the presence of phosphate buffer, carbon dioxide produced, and the initial acidic nature of the particles.

Acanthamoeba mitochondria utilized many TCA cycle intermediates well. Substrate oxidation was shown to depend on mitochondrial size; the more swollen the particles in dilute sucrose solutions, the more complete was the oxidation of substrate. Strong evidence was presented for the localization of succinic acid and citric acid oxidizing enzymes within the mitochondria.

Cofactors such as adenosine, AMP, ADP, ATP, thiamine, TPP and lipoic acid were shown to stimulate aerobic respiration rates and to prolong enzymatic activity in these mitochondria.

Cyanide, malonate, fluoride, DNP and thyroxine were shown to inhibit mitochondrial aerobic respiration. In general, high energy phosphate compounds overcame these inhibitions suggesting a close competition for reaction sites. DNP and malonate were found to be competitive inhibitors; inhibition constants and Michaelis constants were presented. DNP and thyroxine both gave diphasic effects on aerobic respiration. At low concentrations, DNP stimulated and at high concentrations inhibited aerobic respiration. At all concentrations, thyroxine stimulated aerobic respiration initially, but respiration was inhibited with time depending on the experimental conditions.

Many speculations on the author's data were discussed and correlated with data from mammalian mitochondria reported in the literature.

156 pages. \$2.05. Mic 57-2891

INTERACTIONS BETWEEN THIAMINE, CORTISONE, ALLOXAN AND INSULIN ON CARBOHYDRATE AND PROTEIN METABOLISM IN RATS

(Publication No. 21,398)

Alberto Monteiro Wilwerth, Ph.D.
Michigan State University, 1955

1. When young rats were maintained on a thiamine-free diet, symptoms of thiamine deficiency developed within 15 to 20 days. Supplementation of the diet with 2 mg. of thiamine per kilo of diet increased appetite and body weight gains, slightly increased blood sugar and greatly increased glucose tolerance.

2. When 4 mg. of cortisone acetate daily were injected into thiamine-deficient rats, there was a slight increase in the excretion of urinary nitrogen, a slight or no increase in blood glucose, decreased glucose tolerance, reduction in body weight gains and reduced appetite. When 2 mg. of thiamine per kilo of diet (or higher levels of thiamine) were fed to cortisone-treated rats and they were allowed to eat *ad libitum*, urinary nitrogen increased greatly, blood glucose increased moderately, glucose tolerance was partially improved and body weight was maintained at the same initial level or was slightly increased.

3. Thiamine at high levels, fed to rats on a limited-food intake, largely prevented the development of thiamine-deficiency symptoms but was unable to increase the blood glucose of cortisone-treated rats. It slightly increased urinary nitrogen excretion. It is concluded that large doses of thiamine, greater than normal requirements for growing rats, can partially counteract the protein catabolic action of cortisone by increasing food consumption and increasing the availability and utilization of carbohydrate by the organism.

4. Cortisone partially interfered with the favorable action of large doses of thiamine on the efficiency of food utilization for body growth. Hyperglycemia, glucosuria, increased nitrogen excretion and increased insulin resistance were noted, and therefore less carbohydrate was available to exert a "sparing action" on protein for transformation into body weight gains.

5. (a) When young rats were fed a thiamine-free diet, the weight of the kidneys, heart and adrenals were increased and the weight of the thymus and seminal vesicles were greatly decreased. When 1 mg. daily of cortisone acetate was injected into thiamine-deficient rats, a still greater increase in the weight of the kidneys and heart was noted, and a slight increase was found in the weight of the testes and adrenals. The low thymus weight was not decreased further by cortisone treatment, while the seminal vesicles weighed twice as much as those of thiamine-deficient rats.

(b) When thiamine was fed to cortisone-injected rats, the kidneys, heart and testes showed a slight increase in weight. The thymus showed less involution, the adrenals were reduced in weight and the seminal vesicles were slightly but not significantly increased in size. The increases in thymus and seminal vesicles weights apparently were not due to thiamine *per se* but to the concomitant increase in food intake.

6. Alloxan-diabetes did not further reduce the efficiency of food utilization of thiamine-deficient rats or rats on a limited-food intake, but slightly reduced the efficiency of food utilization of thiamine-adequate rats. In the latter there was a consistent increase in blood glucose and urinary nitrogen, while in the thiamine-deficient rats there was neither an increase in blood glucose nor of urinary nitrogen. Rats on a limited food intake but fed thiamine showed a consistent increase in both blood glucose and urinary nitrogen which decreased progressively as chronic inanition developed. When the treatment of the thiamine-deficient rats was reversed, by administering large amounts of thiamine, there was a pronounced hyperglycemia and an increase in urinary nitrogen excretion. It is concluded that thiamine, by increasing food intake, permits hyperglycemia to develop in alloxan-diabetes.

7. When guinea pigs were maintained on a thiamine-free diet, symptoms of thiamine-deficiency developed

within 25 days. Supplementation of their diet with 16 mg. of thiamine per kilo of diet increased appetite and body weight gains. Injections of 5 or 10 mg. of cortisone acetate daily did not appear to reduce body weight significantly in thiamine-deficient guinea pigs in contrast to rats. When cortisone was injected into thiamine-deficient guinea pigs there was no increase in urinary nitrogen or blood glucose, as in rats. When 16 mg. of thiamine or more per kilo of diet were fed to cortisone-treated guinea pigs, only a slight increase in blood glucose was observed with 5 mg. of cortisone injected daily and a consistent increase with 10 mg. of cortisone daily. Cortisone did not increase blood glucose of thiamine-deficient guinea pigs at any level.

8. Insulin was much more effective in reducing blood glucose in normal and alloxanized rats than in cortisone-

treated rats maintained on either a thiamine-deficient or adequate diet. A thiamine-deficient diet reduced the hypoglycemic action of insulin, indicating that thiamine is essential for the maximum action of insulin. The greatest resistance to insulin was found in cortisone-treated rats, confirming the observation that cortisone increases insulin resistance.

9. It is suggested that the over-all effect of large doses of cortisone in young rats, by virtue of its ability to interfere with carbohydrate utilization but at the same time increase the secretion of insulin, is to increase the need for thiamine. The beneficial action of large intake of thiamine in cortisone-treated rats is believed to be brought about by its ability to increase carbohydrate intake and utilization in the presence of hyperinsulinism.

140 pages. \$2.00. Mic 57-2892

POLITICAL SCIENCE

POLITICAL SCIENCE, GENERAL

THE REFORMS IN YUGOSLAVIA, 1948-1954: TITOISM IN ACTION

(Publication No. 21,671)

Fred Warner Neal, Ph.D.
University of Michigan, 1956

The purpose of this study is to present and analyze the doctrinal and organizational changes which evolved in Yugoslavia between 1948, when the Soviet-Yugoslav dispute occurred, and in 1954, by which time a new Marxist theoretical structure and political and economic systems had emerged. The Yugoslav reforms reflect an apparent effort to have a society that is socialist and at the same time democratic. It is the first and most complete experiment with Communism of a sort independent and different from that in the Soviet Union. The dissertation undertakes to show how the Yugoslavs have tried to carry on this experiment and to assess the extent to which they were successful.

The investigation was made by reviewing theoretical principles enunciated by the Yugoslav Communist leaders, studying the texts of laws, decrees and government pronouncements, surveying the organization of the state and the economy and making intensive personal observations in the field. These latter included not only interviews with Yugoslav officials and ordinary citizens but also visits to meetings of Communist Party bodies, local government organs, worker-management bodies, citizens' groups and courts.

The first two chapters deal with the new theory and with changes in the role and organization of the Communist Party, with a notation on the heresy of Milovan Djilas. Chapter III deals with reforms in organization of the federal and republic governments, noting particularly the new-type executive and legislative bodies, and summarizes the Constitution of 1953. Chapter IV concerns the decentralization of the economy, especially methods of planning and control, and the operation of the new workers' councils. Chapter V, dealing with local government, comes next because of the intimate relationship of People's Committees to economic planning and industrial production. Agricultural developments are treated separately--tracing the gradual abandonment of collectivization--because they seem to be in a different category from the other reforms. There is also a discussion of the extent to which totalitarian controls have been relaxed. The final chapter contains a summary of the foregoing as well as certain conclusions of the writer.

These general conclusions may be drawn from the study: First, the Yugoslavs demonstrated that a Communist state can be independent and different from the Soviet Union. Two, in so doing, they made devastating criticisms of the Soviet system, from a Marxist point of view. Three, the Yugoslav state is less totalitarian and more democratic than before, but it is still a dictatorship

and falls far short of Western democratic standards.

Four, there appears to be an essential contradiction in trying to develop Marxist Socialism and political democracy at the same time in Yugoslavia. Five, this contradiction has caused serious ideological and administrative confusion in the new system. Six, it is difficult to see how Yugoslavia can remain half totalitarian, half democratic, without soon developing more in one direction or the other.

362 pages. \$4.65. Mic 57-2893

THE POLITICAL PARTIES OF AUSTRIA

(Publication No. 21,828)

Walter B. Simon, Ph.D.
Columbia University, 1957

The four Austrian parties are identified by their ideologies as Pro-clerical, Socialist, German-nationalist, and Communist. The ideologies of the three major parties are traced to their common origin through an analysis of their attitudes towards the state and towards one another, in the final decades of Imperial Austria, in the First Republic, and in the Second Republic.

The failure of parliamentary government in Imperial Austria and the First Republic is contrasted with its success in the Second Republic. Explanations for failure and success of parliamentary government are offered in Weberian terms of "ethics of ultimate ends" expressed by uncompromising ideological commitments and "ethics of responsibility" conducive to parliamentary compromise.

The regional distribution of party strength is investigated by longitudinal examination of election results in Austria's electoral units and in Vienna's municipal districts. Tabulations of the parties' strongest and weakest areas indicate the existence of enduring voting patterns.

Data from the most recent elections indicate the direction of short term trends. Data from elections long past reveal potentialities for cyclical developments that result from ever-present voting tendencies termed as "subliminal voting tendencies."

Religion and class are analyzed as factors in voting. The comparative stability of the voting traditions of industrial labor and of the proclerical farmers are contrasted with the fluidity of the vote of the anti-clerical middle class.

The softened ideological commitments of the parties that have shifted from "ethics of ultimate ends" towards "ethics of responsibility" are reflected by a greater heterogeneity in the following of the various parties. Region, religion, and economic class have remained factors in voting, but none of these factors are as important now as they once were.

An analysis of the extraordinarily high voting participation brings out the fact that Austrian participation is

highest among the working class. It is shown how the Socialist party benefits from a reduction of interest since the resulting drop in voting participation is smaller among labor than among the electorate as a whole. This is accomplished by the all-encompassing mass organizations of the Socialist party.

A chapter on the Jewish vote describes the dilemma confronting the Jewish middle class at the polls when none of the major parties appealed for its vote. The findings confirm previous observations to the effect that the economic factor plays a comparatively smaller part in the vote of minority groups than in the vote of the electorate as a whole.

An analysis of German and Austrian election results indicates that the mass vote for Nazism in the early thirties was not motivated by ideological considerations but by a desire to express discontent.

The Communist mass vote in the Second Republic likewise appears motivated by protest rather than by ideology. In this context belongs a study of the vote of Austria's Slovenian minority in 1945 which demonstrated the impact of nationalism and Communism upon traditionally conservative peasants. The effect of the Soviet occupation upon the Communist vote is also studied.

The above mentioned chapters suggest as a general hypothesis that a totalitarian mass vote should not be considered as endorsement of a program or of a platform but as an unspecified protest.

In this study, analysis of election results was thus applied to investigate the following:

1. The existence of patterns, trends, and cycles.
2. The factors of which voting is a function, and the importance of such factors.
3. The diagnostic significance of the various factors of voting with reference to Weberian ethics.
4. The diagnostic significance of factors in the vote of a minority group.
5. The motivations involved in a totalitarian mass vote.

381 pages. \$4.90. Mic 57-2894

POLITICAL SCIENCE, INTERNATIONAL LAW AND RELATIONS

A CRITICAL STUDY OF THE FUNCTIONALIST APPROACH TO INTERNATIONAL ORGANIZATION

(Publication No. 22,043)

Harold Edward Engle, Ph.D.
Columbia University, 1957

Part I offers a statement and critique of the political theory of the functionalist approach, especially as formulated in the works of Paul S. Reinsch, Leonard Woolf, Harold R. G. Greaves, and David Mitrany. Resembling various forms of political pluralism at the national level, including guild socialism and Social Catholicism, this approach seeks a highly decentralized system of government based on some form of functional representation and functional self-government, and promising a reintegration of the individual into a communal group characterized by internal peace.

Much the same theoretical criticisms can be made of functional representation and functional devolution at the international as at the national level. Underlying these weaknesses is a false dichotomy between the political and the technical. If politics is conceived as the process by which a group arrives at its value-choices, then so-called technical decisions may be considered part of the larger realm of political decisions, made to be consistent with or support decisions concerning the major values of the group. In analyzing the behavior of decision-makers, then, it is important to abandon a motivational approach (dividing politicians from technicians according to the moral worth of their motives) in favor of a structural-functional approach, noting their respective positions in the social structure and their respective functions in different systems of social action.

Part II surveys the leading French and German business, trade, and labor journals to see whether the attitudes expressed concerning the European Coal and Steel Community in its early phases bear out certain derived functionalist hypotheses regarding economic, political, and psychological integration. In the economic realm, statements of representative business and labor spokesmen showed the limitations of an attempt to govern each technical realm separately, both because of the close links between the coal-steel sector and other sectors of the economy and because of the existence of general economic policies affecting the economy as a whole. The resulting need for a continuing central authority -- located in the national governments at present -- was also evident as a limitation on the contribution of functional agencies to transnational political integration.

In the psychological realm, the structural determinants of reference-group orientations to national groups were found to lie largely in the so-called technical realm, while orientations to transnational reference groups -- and especially to "Europe" as a potential communal group -- were largely structured by factors which would be considered "political." It may be concluded, therefore, that a shift in reference-group orientations from national to transnational groups may be attributed to changes in the social structure broader than those introduced by a functional agency as such.

Part III reconsiders briefly the institutions-consensus dilemma and the problem of transnational integration stated at the beginning of the study. The lack of moral consensus among people of different countries is assumed, by those who pose the dilemma, to bar the establishment of a centralized supranational government, but the experience of participating in international governmental institutions -- such as the functionalist approach would provide -- is considered essential to the growth of transnational consensus. The reference-group behavior examined in Part II, however, suggests that a decisive step toward the development of such consensus is a shift in reference-group orientations to a transnational "alternate community," to which basic communal values formerly shared on a national scale can then be attributed. This shift in orientations, in turn, would seem to be structured, in a case like that of Western Europe, by changes not only in science and technology, as the functionalists have stressed, but especially in the power structure of international relations and the foreign policies of the great powers.

575 pages. \$7.30. Mic 57-2895

**A CRITICAL EXAMINATION OF UNITED STATES
POLICY TOWARD GERMAN INDUSTRIAL
DISARMAMENT (1943-1955)**

(Publication No. 21,836)

Frederick Henry Gareau, Ph.D.
The American University, 1957

There have been two occasions when victorious powers have attempted to maintain the disarmament of defeated nations by reducing substantially their industrial capacity. These two instances of industrial disarmament occurred in postwar Japan and Germany. This dissertation is a case study of American policy toward the industrial disarmament of Germany.

The United States at first showed herself to be an avid supporter of this new technique of national policy. In September, 1944, President Roosevelt accepted the Morgenthau Plan, which would have deprived Germany of all heavy industry. Eleven days later the President repudiated this plan. American policy makers then advocated a serious reduction in the capacity of German heavy industry, rather than its complete elimination. The new American policy was evident at the negotiations for the level of German industry plan of March, 1946. Although American representatives at these negotiations advocated substantial reductions in the capacity of heavy industries, they proposed higher levels of industry than the French or Soviet representatives.

Starting in the spring of 1946, the United States became more and more dissatisfied with the industrial disarmament program. In May, General Clay stopped dismantling in the American Occupation Zone on the grounds that German economic unity had not been established. In September, Secretary of State Byrnes declared that the United States desired that the Ruhr and its industries should remain German. In April, the United States proposed the Byrnes Treaty to guarantee the military disarmament of Germany for twenty-five years. In negotiations with the Allies the United States offered the security which this treaty would provide as a substitute for industrial disarmament.

The United States was the driving force behind the successful attempts to save the great bulk of German plants from dismantling and to remove the legal restrictions on industrial capacity and production. Many plants were removed from the dismantling lists in August of 1947, when the European Recovery Program was inaugurated, and when the Federal Republic was established. The legal restrictions on industrial capacity and production were removed gradually in a series of concessions until in May, 1955, all such restrictions were repealed.

Two main conclusions are made in this study: (1) that the industrial disarmament program in Germany did not serve the interests of the United States; and (2) that industrial disarmament is not recommended as a good method of maintaining the disarmament of a defeated nation. By destroying much of the industrial potential of defeated enemy states, industrial disarmament creates a rigid system of power relations, in which a policy of balance of power cannot be practiced. So much ill will is created in the victim state by industrial disarmament that a policy of befriending former enemies to enlist their aid against present enemies is all but impossible. Industrial disarmament reduces the standard of living of its victims

and requires a mass exodus of people from industrial areas. Dismantling, one of the chief forms of industrial disarmament, is a very inefficient method of transferring reparations payments. Industrial disarmament is actually unnecessary. The disarmament of a defeated nation can be maintained by denying it armed forces and preventing it from manufacturing military weapons. There is no need to reduce the capacity or production of its heavy industries.

386 pages. \$4.95. Mic 57-2896

**INTERNATIONAL RIVERS IN THE MIDDLE EAST:
A HYDROPOLITICAL STUDY AND A LEGAL ANALYSIS**

(Publication No. 22,051)

Abraham Menco Hirsch, Ph.D.
Columbia University, 1957

The Middle East, in the present study, embraces southwest Asia (except for the Arabian Peninsula) as far east as Afghanistan, West Pakistan, and the adjoining districts of India. This area offers a unique opportunity for a case-study of international rivalry over limited regional water resources, and for the study of current evolution of international water-utilization law.

It appears that since the dawn of history, the area has been the locale of a cyclical clash between the polities based economically and institutionally on the carefully planned and organized exploitation of water resources (largely rivers) on the one hand, and nomadic groups on the other hand. To maintain and consolidate their power, the polities of the Middle East, today as centuries ago, must be able to arrogate to themselves control over maximal water resources so that they may strengthen themselves against the centrifugal nomads internally and against competing States externally. The rivalry over control of these vital water resources gives rise to a pattern of "hydropolitical" relations, which are examined in the opening chapters of the study. At the present time, a great variety of the area's social and economic problems are reflected in its hydropolitics, because water is needed to help solve so many of the area's woes -- economic underdevelopment, population and refugee problems, and changing political and geopolitical patterns. The economic bases of river hydropolitics are structured in terms of a critical apparatus which may serve to assist in the understanding of river-basin hydro-economics.

The dissertation examines present trends in the economic role which rivers play in the Middle East. The assembled data indicates that the water demand of the area's States is likely to increase sharply; this will make regional coordination of river development increasingly imperative.

The history of water legislation in the Middle East goes back to antiquity. Ancient, Talmudic, Muslim, Ottoman and modern water laws are surveyed. The modern trend appears to be towards increasingly strict State-control over water resources.

An examination of the several current river-disputes discloses certain general similarities which these disputes share. Particularly noteworthy is the degree to which these international disputes arouse public opinion, thus hampering the actions of governments who may be

prepared to back down from earlier positions in order to reach agreement with each other. A complicating factor in equitable division of rights to rivers is the fact that modern boundaries of the Middle East were generally drawn in spite of hydro-economic considerations.

International treaties dealing with Middle East rivers are detailedly studied. It appears from them that there exists in the area a "rule of basin-coordination", widely though not universally observed; it requires mutual consultation before the initiation of new river diversions (or at least the offer of such consultation). Many precedents exist for mutually-satisfactory arrangements on river development.

In recent years, three types of proposals have been made for international organization of key river basins above the boundary-commission or ad-hoc commission level. They are centralized development, unified apportionment, and partition of the basin; these three proposals are examined in detail, and in the light of certain concepts derived from the study of hydropolitics and of its economic bases.

The Middle East appears to be the laboratory of current developments in international water-utilization law, a distinct branch of international law and organization which, in order to grow, must heavily lean on the several social and technical sciences.

341 pages. \$4.40. Mic 57-2897

THE OPERATION OF INTERNATIONAL TRUSTEESHIP

(Publication No. 21,840)

Abdul Aziz Said, Ph.D.
The American University, 1957

The purposes of this dissertation are threefold: (1) tracing the origins and evolution of the principle of international trusteeship, (2) exposition of the nature of the present Trusteeship System of the United Nations, and (3) an evaluation of its accomplishments and effectiveness.

Chapter one gives a brief survey of historical origins. This survey attempts to trace the factors which advanced the development of the principle of international responsibility toward the people of dependent areas, bringing into focus the nature of this development.

Chapter two inquires into the processes which culminated in the establishment of the International Trusteeship System under the United Nations. Accordingly, the processes which led to the formation of the Trusteeship provisions of the Charter in the Yalta agreement and the United Nations Conference on International Organization are treated first. Subsequently, the process of transition from the trusteeship provision of the Charter to the setting up of the Trusteeship System was examined. The remainder of this chapter is devoted to an analysis of the considerations behind the designation of Trust Territories and the nature and scope of the Trusteeship Agreements.

Chapter three examines the Trusteeship Council from the organizational and operational viewpoints, in an effort to determine whether it provides for satisfactory coordination and adequate machinery. The composition as well as the scope of authority and procedure of the Council are studied in their theoretical and operative contexts. In

conclusion an attempt has been made to evaluate the Trusteeship Council as an instrument for achieving the basic objectives of the Trusteeship System as pronounced in Chapter XII of the Charter.

In Chapter four attention is given to the relations between the Trusteeship Council and other organs of the United Nations and Specialized Agencies. An endeavor was made to examine and discuss the relationship of the Trusteeship Council to the General Assembly and the Security Council. Thereupon the inquiry centers on the relationship of the Trusteeship Council to the Economic and Social Council and Specialized Agencies. The investigation in this chapter was conducted on two levels--relationships as prescribed by the Charter and the relationships as they have developed in practice.

Chapter five is devoted to a study of Visiting Missions as an instrument of international supervision. The first part of this essay is aimed at interpreting the term "supervision" as used in the Charter of the United Nations in the light of practical developments; the next few pages explore the other processes of international supervision, namely the consideration of annual reports and the examination of petitions. The remainder of the chapter analyses the postulate of Visiting Missions and studies the Visiting Mission in action.

Chapter six contains a study of the problem of Administrative Unions as it affects the various Trust Territories. This chapter is mainly concerned with an inquiry into the dilemma facing Administrative Unions, and traces the United Nations deliberations which led to the establishment of the Standing Committee on Administrative Unions. Thereupon an effort has been made to examine the activities of the Standing Committee on Administrative Unions in attempting to safeguard the territorial integrity of the Trust Territories from absorption by the Administering Authorities.

Chapter seven aims to give a balance sheet of the achievements of the Trusteeship System. The political, economic, social and educational advancement of the Trust Territories during the first decade of operation of the Trusteeship Council are discussed.

The study concludes with a critical analysis of the Trusteeship System as it has developed since its inception ten years ago and a recommendation of conceivable improvements of the whole machinery of Trusteeships.

Throughout this study, and whenever judged necessary, lines of comparison have been drawn between the Permanent Mandates Commission under the League of Nations and the present Trusteeship Council. In undertaking this study reliance was placed mainly on documents and official records of the League of Nations, the United Nations, and governmental publications. Also, important secondary sources have been consulted. The study was conducted through an analytical method, with occasional use of the historical and comparative methods.

307 pages. \$3.95. Mic 57-2898

THE MEMBERSHIP OF DEPENDENCIES
IN INTERNATIONAL ORGANIZATIONS
IN THE FIELD OF COMMUNICATIONS

(Publication No. 21,824)

Teresa Schmatz, Ph.D.
Columbia University, 1957

Among international administrative unions, the Universal Postal Union and the International Telegraph Union granted dependencies their earliest and, as the years progressed, their most widespread representation. This study has attempted to point out the most outstanding of the developments made by these organizations in this matter of granting membership to dependencies.

The study is divided into two parts. The first deals with the Universal Postal Union and the second with the International Telecommunications Union which is an amalgamation of the International Telegraph Union and the International Radiotelegraph Union. The first chapter discusses the various types of membership which these dependencies may attain in the Universal Postal Union and the procedures by which this may be accomplished. A historical description of the development of this membership status within the Union is the topic of the second chapter. It traces this development from the first Postal Congress of Berne, 1874, down to the Congress held in Brussels in 1952 with emphasis upon the various arguments which were presented by the delegates both pro and con on this question. The third chapter attempts to analyze the role of dependencies in the Universal Postal Union and to show how they actually participated in the Union. Among the activities which are covered are those of financial contributions, arbitration, membership on committees and the all-important question of voting. The second part, dealing with the Telecommunications Union, follows much the same general outline.

An answer to the question when and how these dependencies acquired the right to belong to these international organizations and partake in their activities can quite readily be given. The question of the status of these dependencies within these Unions is not quite so easily resolved. However, there is no doubt that certain dependencies were granted a status which is the same as that of any sovereign state. The attribution of this membership to some dependencies and not to others seemed to be quite arbitrary. There seemed to be no legal criteria which guided the granting of membership status to some and the refusal of it to others.

The reasons as to why membership was granted so readily in these organizations can be ascribed firstly to the very nature of the organizations themselves. They were technical unions primarily interested in making their organization as world wide as possible and the matter of communications, with which they were dealing, itself forced this upon them. Secondly, the very language of their conventions made the admission of dependencies a relatively easy matter. There was no strict adherence to the tight legal language found in political organizations; in fact, the delegates shied away from this and made the test easily subject to variable interpretations.

Further, although membership may have been granted to these dependencies because it was felt that they possessed an autonomous postal or telegraph service, as time progressed these dependencies were largely used to gain

extra votes for the mother country, for, as may be seen from the voting records of the dependencies, they usually voted with the mother country. This question of "colonial voting" then largely became a matter of weighted voting. This was a solution to the problem which had been created by the axiom--one state, one vote--which, instead of bringing about the much vaunted equality, actually succeeded in making for inequality. "Colonial voting" may not have been the most equitable solution in this case, for surely some criteria could have been chosen more in keeping with the aims of the Unions, but it was one answer to the vexing problem.

The entire question of the international status of dependencies has been delved into only lightly here, but the material examined here could well be analyzed further for light on this subject. 308 pages. \$3.95. Mic 57-2899

DER BEOBACHTER; seine Stellung und seine Bedeutung;
eine völkerrechtliche Untersuchung als Beitrag zum
Studium der Struktur der Internationalen Organisation
(THE OBSERVER—POSITION AND SIGNIFICANCE,
A Study in International Public Law as a Contribution to
the Study of the Structure of International Organization)

(Publication No. 21,681)

Diether Steppuhn, Dr. jur.
University of Würzburg, 1956

The dissertation¹⁾ deals with an important aspect of International Public Law which, as it appears, has never been the topic of a serious and thorough scientific investigation. Due to this fact there is little authentic material on which the study could be based; so the author had to secure first-hand information and data - partly by immediate interviews with leading contemporary politicians and diplomats, partly by personally corresponding with outstanding continental and overseas agencies and institutes, partly by epitomizing essential facts from numerous documents of both private and public international organizations.

A short preface - headed by René Massigli's quotation: "I am nothing but a pencil with ears" - explains the difficulties which meet with a genuinely and truly scientific treatment of the issue: for one thing the Observer has a certain political quality and aspect, for another he is a most recent innovation within International Organization - two facts which in particular make it hard to assign him to a definitely fixed position within the structural system of International Public Law.

The work is divided into three large sections, the first of which explores the basis of the study. After an introductory note - explaining where scientific research necessarily must start out from -, the first chapter gives a summary of the general historical development of the Law of Nations which led to what today appears as "International Organization". After briefly tracing the essential factors - the Industrial Revolution, the "Democratization" of International Life, and especially that certain feeling of interdependence of individuals and states which can clearly be noted during the last century -, the study gives a survey of the present structure of International Organization: the classification of international organizations and their

conferences culminates in a two-track distinction of public and private international bodies. This biflexity of the conference system - and consequently of the complete structure of International Organization - is the first essential perception of the study and is illustrated by a diagram.

The second section applies what has been established to the phenomenon of the Observer itself. The first chapter again is historical and shows the development which led to this innovation: examples of international agents appointed by governments in an inofficial capacity can be found since 1820 at several international meetings. Birth was given to the "Observer" in pursuance of the so-called Monroe-Docctrine practiced by the United States of America since 1823. The necessary effort to somehow participate in what happened in other parts of the world - particularly on the Continent during and after World War I - without offending the main principle of this doctrine forced the US government to appoint certain representatives for consultative and informative purposes in an unofficial quality. The first official Observers were presented to the public and introduced into International Organization at the conference of Lausanne in 1922/23. By reading to the assembly the instructions they had been given by their government, the two US representatives issued what might be termed the "Magna Charta of the Observer". In the years to follow, the use of Observers as unofficial and official representatives without full authorities grew more and more frequent and was not confined to the public conference but also transferred to private gatherings on the international level. - The following chapters deal with different aspects of the new institution: the third exploring the "Raison d'être" more closely; the next giving a general classification of the types of Observers; the last trying to indicate the legal foundations for appointing Observers: it is shown - and this is the second essential perception of the study - that such positive legal regulations are extremely rare and this fact applies both to private and public international conferences.

The third and largest section of the dissertation draws legal conclusions from what has been stated in the previous sections. After another short introductory note - outlining the extent and the aim of the inquiry - the second chapter contains a comprehensive legal definition and defends it against an opinion of experts given in 1952 at the request of the European Coal and Steel Community. - The following chapters deal with the Observer's duty and assignment and his position within the conference body. Then the scope of his participation in the proceedings of the conference is examined²); it is shown that a certain trend to expand the Observer's authorities - e.g., to a right of speaking - is noticeable, yet the right of voting never has been granted. - After the granting of a diplomatic status "ipso jure" has been denied to the Observer³), another chapter explores his legal position within the established biflexity of the conference system and thus within International Organization: although the institution of the Observer appears more important in the sphere of private international coöperation, the presence and the position of the Observer on the more political level of the public international gathering causes more serious legal problems. Since international treaties more and more had to serve as the source for new international law and since the conference is the usual place where such treaties are made, these gatherings started resembling legislative bodies. In addition to such obstacles as the principles of the Legal Equality of States or the

Unanimity Rule, another obstruction to the efficiency of conference work and results was introduced by the institution of the Observer participating in treaty-making conferences. The question whether a state represented by an Observer who has no authority to sign such a treaty is held or bound to any degree or in any respect, whatsoever, can hardly be answered "de lege lata". It seems necessary to draft a completely new conception of the forfeiture in International Public Law; this conception should be based upon the institution of impleading - the "Litis denunciatio" of the Roman Civil Law - and "de lege ferenda" be developed into a legal impediment against certain allegations of such a party which has not signed the treaty in question but which has been participating at the negotiations being represented by an Observer. - The last chapter summarizes what has been established and gives a general answer to the question whether the Observer with all the qualities stated already has gained a definite position within the system of International Organization: it is the third essential perception that - in answer to this question the Observer, indeed, acquired a position within the system of International Public Law which is fixed by customary law rather than by positive regulations.

A large annex to the dissertation contains two sections. The first gives - in connection with the biflexity of International Organization recognized earlier - in an extensive synopsis numerous examples of conferences of all types where Observers have been participating. The second section contains a voluminous and useful bibliography of 150 books - most of which are of US origin - and several other publications. 138 pages. \$2.00. Mic 57-2900

1. It is written in the German language.
2. Two diagrams are added for illustration.
3. Three diagrams are added for illustration.

BLOC VOTING IN THE UNITED NATIONS, 1946-1951

(Publication No. 21,771)

Claude C. Woltz, Ph.D.
New York University, 1957

Adviser: Dr. Waldo Chamberlin

The purpose of this study was to determine the extent of bloc voting and its effect on major decisions taken during the first six years of the United Nations.

An examination was made of the voting records in all United Nations organs and a complete tabulation of all roll-call votes for the first six sessions of the General Assembly was prepared.

A voting bloc was defined as any group of states which, to a significant extent, voted alike on all or on certain types of issues in the United Nations.

The groups examined were Latin America, the Arab League, the British Commonwealth, Eastern Europe, Southeast Asia and Western Europe, including the Scandinavian and Benelux groups. Except for the Commonwealth, all of the above might be considered as regional groups, although not all of them are constituted as formal regional organizations.

India and Pakistan were considered as members of both

the Commonwealth and the Southeast Asian group. The United Kingdom was included in the study of Western Europe as well as with the Commonwealth.

The outstanding feature of voting in all organs of the United Nations during this period was the frequency with which the Soviet bloc was aligned against all or most of the other members. This pattern, however, began to change somewhat during 1950 when a so-called "third force" emerged, composed mainly of Arab-Asian states. On controversial "East-West" issues this group usually took a neutral position. This Arab-Asian bloc was particularly active during the Korean crisis.

One of the major developments during the first six years of the United Nations was the shift of a large measure of responsibility for the maintenance of peace from the Security Council to the General Assembly. This minimized the effect of the veto in the Council, but increased the significance of bloc voting in the Assembly.

Bloc voting and vote "swapping" undoubtedly played a major part in many United Nations decisions; particularly those concerned with the disposition of the former Italian Colonies, the adoption of Spanish as a working language, the international regime for Jerusalem and others. The influence of bloc voting was also evident in elections to United Nations organs.

An analysis of the 319 roll-call votes in the General Assembly through 1951 shows that, disregarding absences, the Soviet group voted as a solid bloc 295 times; the Scandinavian states, 201 times; the Arab League, 194 times; Western Europe, 124 times; Benelux, 121 times; Southeast Asia, 107 times; Latin America, 56 times; and the British Commonwealth, 38 times. Among the older members of the Commonwealth there was a much higher degree of solidarity. During 1950 and 1951 the North Atlantic Treaty members showed an increased tendency to vote as a bloc.

In the Trusteeship Council a high percentage of votes showed the colonial powers aligned against the non-colonial states. The voting pattern in the Economic and Social Council was similar to that in the General Assembly.

Bloc voting has, in some instances, helped the smaller states to increase their political influence in the United Nations. Some negative aspects of bloc voting occurred when blocs became too rigid; when the concern for voting power outweighed considerations of principle; or when the votes of a group of states were dictated by a single power.

Because of the increased responsibilities of the General Assembly, the smaller states have obtained a greater measure of voting strength. Nothing will have been gained, however, if they use this voting strength to adopt irresponsible measures which the major powers cannot or will not carry out.

370 pages. \$4.75. Mic 57-2901

THE ADMINISTRATIVE UNION IN THE OPERATION OF THE UNITED NATIONS TRUSTEESHIP SYSTEM

(Publication No. 21,656)

Herbert Hartle Wood, Jr., Ph.D.
Columbia University, 1957

The term "administrative union" is used in this study to describe administrative, fiscal and customs arrange-

ments which associate a United Nations Trust Territory with an adjacent colony. Five trust territories have been so affected. The United Kingdom administers three: British Cameroons which is administered in union with Nigeria; British Togoland which is administered in union with the Gold Coast; and Tanganyika, which is a member, along with Kenya and Uganda, of the East Africa Inter-Territorial Organization. Belgium administers Ruanda-Urundi in union with the Belgian Congo. Australia administers New Guinea in union with Papua.

These unions differ from each other both in purpose and nature. They have in common, however, some compromising of the individuality of the trust territory involved. It is this aspect which serves as the primary focal point of this study, especially as it relates to the supervisory powers of United Nations organs.

Attention is given to steps taken toward the establishment of administrative unions under the Mandate System of the League of Nations. Unions involving British Cameroons, British Togoland and Ruanda-Urundi came into existence by 1925. Unions affecting Tanganyika and New Guinea were under consideration by the mandatory powers during the mandate period. The attitude taken by the Permanent Mandates Commission toward administrative unions was on the whole permissive but it offers significant background to later United Nations discussions of the problem, particularly as regards the problems of separate information concerning the mandated territory and prior notification to the Commission regarding changes in administrative arrangements involving the mandated territories.

Developments during World War II brought the New Guinea-Papua union into existence and set in motion closer inter-territorial cooperation in East Africa. During the negotiation of the trusteeship agreements in the General Assembly of the United Nations, it became apparent that those nations planning to or already using administrative unions in connection with trust territories were determined to keep those unions intact with the support of appropriate provisions in the agreements.

The period covered by this study, aside from a brief consideration of the League of Nations and certain war-time precedents, begins with the advent of the United Nations and ends in December 1955, approximately the first ten years of existence of the United Nations.

The study surveys the discussions in the various organs of the United Nations related to the question of administrative unions and attempts to draw from the views of member states and resolutions the principal issues raised and the standards sought. Each of the unions, as constituted in 1955, is described as to structure and power relationships. The greatest attention is given to the problem of international supervision posed by administrative unions. These include the problem of complete information on the trust territory, access of visiting missions to the trust territory and union organs, prior consultation as to changes in the administrative relationships, maintenance of boundaries, separate status and identity of the trust territory, and the general problems concerned with supervision as well as the hearing of petitions from the trust territory. Finally, the effects upon the trust territory resulting from an administrative union are weighted, territory by territory, particularly as regards the achievement of the purposes of the United Nations Trusteeship System.

Administrative unions appear to result from a desire for administrative efficiency and economy rather than from a desire to subvert the trusteeship system, and offer a very helpful alternative to the all too common tendency to fractionalize political units in underdeveloped areas. The conclusion is reached that the problem of administrative unions has taken on an exaggerated importance due to its usefulness as an item of challenge to the responsible powers by those United Nations members who are either pro-Soviet or anti-colonial minded. While administrative unions would certainly have created at least minor problems in United Nations supervision, the active attention that they have received has been more than enough to check any serious disruptions that they might have caused to the trusteeship system. Achievement of independence or self-government by the trust territories concerned will no doubt overshadow and diminish the significance of any snarls that have been created by administrative unions. On the other hand, only in the cases of Tanganyika and Ruanda-Urundi does there appear to be a likelihood that the trust territory will gain independence or self-government apart from the administrative union concerned.

404 pages. \$5.15. Mic 57-2902

**THE SYRIAN ECONOMY,
A STUDY IN REGIONAL CHAOS**

(Publication No. 21,935)

Elias Kamal Zughaib, Ph.D.
Syracuse University, 1957

One of the present goals of both the United States and the Soviet Union is the economic development of the backward areas. The United States wants those countries developed so that they can withstand the pressure of Communism and not succumb to its promises. The Soviets are offering a helping hand for their own reasons. Coupled with this tug of war is the desire and efforts of the backward countries themselves to attain higher standards of living and a chance to catch up with the more advanced nations of the world.

Economic development may be defined briefly as the "growth of output per head of population." Many powerful factors are suppressing this growth of output in Syria. Internal and external political instability, uncongenial social and cultural atmosphere, and adverse economic factors are stifling economic development.

Political instability has its roots and causes deep in Syria's history. The Mongol invasions, the long Turkish occupation and the Mandate system, which resulted in the forced division of Syria's geographic entity, all have been detrimental to the economic growth of the country. The Syrian socio-cultural atmosphere fosters fatalism, love for the traditional, abhorance of risk taking and a lack of respect for manual labor, all of which prevent the rise of individualism, and restrict the Syrians' ability to "manoeuvre economically." Islam must not be overlooked as a deciding factor in the economic destiny of the country, as it is not only a theology but also a complete civilization which includes a whole complex of the political, social and economic aspects of the faithful. As a spiritual experience, Islam has "withstood the test of time," but its effect as a

social order has been "negative for a long time." In the economic sphere, Syria has taken impressive steps since 1945. However, further and consistent development depends on changes in the Syrian scene, such as laws, thinking, nationalism, etc.

This study places the problem in a historical-political perspective. It, then, proceeds to a critique and examination of the Syrian economy between the years 1945-1955.

In the agricultural field, the economic development of Syria entails the extension of the cultivated area. Due to the scarcity of rain, this increase will have to depend on irrigation schemes involving the major rivers and streams, almost all of which are international in that they either rise, flow or empty in non-Syrian territory. Agreements on the division and utilization of the water are prerequisites to the initiation of irrigation projects. The growth of the Syrian industry will have to depend on a large market encompassing most of the neighboring countries, as Syria has a weak market and low purchasing power. The improvement of the transportation network and even the educational facilities depend on regional cooperation and understanding. This is made imperative by Syria's geographical location which gives international significance to its development plans.

Apart from improving conditions within its present boundaries, such as land tenure, housing, community services, health, education, fiscal system, etc., the answer to Syria's development is regional cooperation. In other words, all the countries that composed pre-1919 Syria must agree on the joint development of their resources. As this joint action will have to include Israel, it may prove to be a solution to the Arab-Israeli dispute, as well as a road to the economic development of the whole region including Syria. 342 pages. \$4.40. Mic 57-2903

**POLITICAL SCIENCE, PUBLIC
ADMINISTRATION**

**SOCIAL SECURITY LEGISLATION IN THE
UNITED STATES, ITS SIGNIFICANCE AND
USEFULNESS FOR PLANNING SOCIAL SECURITY
IN INDIA**

(Publication No. 21,905)

Pratap Vinayak Bhambal, D.P.A.
Syracuse University, 1957

Early American colonists brought with them English manners and customs, social and legal institutions and their philosophical approach to human existence. One of the institutions they imported was the English Poor Law system. Poor Laws became operative as soon as the colonists became settled and social controls were established. As in the days of Queen Elizabeth, localities assumed responsibility of dependent persons and administration of public assistance. An unusual burden was placed upon the local property tax. The inadequacies of local responsibility were exposed everywhere during depression and the Federal government had to assume responsibility.

New York State which has had a long experience in the

administration of public welfare; and other populous states who had assumed responsibility for state emergency relief programs, provided the experience and key personnel for the federal programs which appeared later.

Social Security Act of 1935 was designed to meet certain immediate needs and help to prevent future want and dependency that engulfed the United States at the time of its passage. Long range provisions of the Act resulted in insurance benefit for employees in commerce and industry and has furnished them basic income in old age retirement and during limited periods of involuntary unemployment. It also brought needed protection to the aged women who outlived their husbands and assured continuing income for the surviving children of the insured workers. Coverage has since been extended to larger numbers from time to time.

Public assistance programs have helped to maintain the needy aged, blind and disabled in their own homes. Maternal and child health, crippled childrens' and child welfare services have been greatly improved.

Conditions in India today are almost parallel to those which existed in the colonial America. There is an all

round drive in the country now to employ able-bodied employables by reconstruction of old industries, opening new ones, and cottage industries for rural areas. There are schemes for old age pensions only for certain municipal and commercial services and generally for all government services. Maternity and child welfare services have already begun in India but they are still in their infancy as compared with those of the United States.

The different conferences organized by the International Labor Organization on social security and the "Beveridge Plan" made important contributions in developing the conception of social security in India which resulted in the passage of "The Employees' State Insurance Act 1948" and "Employees' Provident Fund Act 1952."

With the Industrial revolution taking place in the country and the problem of unemployment being successfully tackled, there is an indicated need that India should refer to appropriate applicable experience of other advanced countries and the United States particularly, out of which there may be developed an adequate foundation for a system of social security that is comprehensive, universal and uniform in its application to the needs of the Indian people.

277 pages. \$3.60. Mic 57-2904

PSYCHOLOGY

PSYCHOLOGY, GENERAL

THE DIFFERENTIAL EFFECTS OF TWO
PSYCHOTHERAPEUTIC APPROACHES ON
CLIENT PERCEPTIONS

(Publication No. 21,097)

Elliot Baker, Ph.D.

The Pennsylvania State University, 1957

Much of psychotherapy may be viewed as the process of reducing indiscriminate perceptions and effecting increased differentiation of the perceptual field. One aspect of indiscriminate perceptions is the tendency for the person to have vague or unclear ideas and feelings about himself. Another facet of indiscriminate behavior is the tendency for the individual to overgeneralize his experiences. This overgeneralization may be reflected in two directions, outwardly and inwardly. The outward manifestation is called stereotyping. In this instance, the person is overextending an abstraction about others. The inward manifestation is termed personal overgeneralization and is noted when the person makes overgeneralizations about himself. Somewhat related to these concepts is the person's tendency to resist analyzing problems.

The investigation was therefore an attempt to study the differential effects of a leading and of a reflective psychotherapy on indiscriminate perceptions and resistance to analyzing problems. The leading psychotherapy was derived from Neo-Freudian principles and utilized such techniques as the following: Directive Leads, Directive Structuring, Approval, Encouragement, and Reassurance, Advice, Information and Persuasion, and Interpretation.

The reflective psychotherapy was based on Rogerian principles and contained the following categories of verbal behavior: Non-directive Leads, Non-directive Structuring, Restatement of Content, and Clarification of Feeling.

Essentially, the therapist applying the reflective techniques works with only those feelings and thoughts which lie within the client's phenomenological field, whereas the therapist applying the leading techniques directs or introduces elements not in the client's present awareness.

It was assumed that the person who comes into psychotherapy is a relatively dependent individual who needs to be more actively guided by the therapist during the early stages of treatment. It was further assumed that a reflective psychotherapy required more autonomy on the part of the client than a leading psychotherapy. On the basis of these assumptions, the following directional hypotheses were specified:

- A leading psychotherapy will reduce indiscriminate perceptions more than a reflective psychotherapy;
- will reduce personal overgeneralizations more than a reflective psychotherapy;
- will reduce discrepancies between the way a person perceives himself and the way others perceive him more than a reflective psychotherapy;
- will reduce stereotyping more than a reflective psychotherapy;
- will reduce resistance to analyzing problems more than a reflective psychotherapy.

Persons who discontinue psychotherapy will reveal

more resistance to analyzing problems than will those who continue psychotherapy.

An analysis of variance design was used. The design was initially set up for two treatment conditions, ten therapists, and 40 clients. Clients were assigned randomly to treatments and therapists.

Each client was scheduled to be seen for a 50 minute session each week. Tests were administered before and upon completion of therapy. The therapists in the study were advanced graduate students in clinical psychology, who averaged one year of previous counseling experience. Further training was given to them in order to improve their ability to differentiate the two experimental conditions. Recordings of the interviews were analyzed. All therapists were able to maintain the experimental conditions. The clients in the experiment were largely college students. For the most part, they could be characterized as mildly to moderately neurotic with symptomatology focused on academic difficulties.

Only those clients who were seen for at least four sessions and who returned their post-therapy tests were included in the analysis. Therefore, the statistical analysis of results is based on data obtained from a total of seven therapists and 28 clients. The experimental interviews averaged seven sessions.

The following tentative conclusions are offered:

A leading psychotherapy may be more effective than a reflective psychotherapy in reducing the tendency for a person to make overgeneralizations about himself.

Clients who discontinue psychotherapy reveal relatively more resistance to analyzing problems than those who continue psychotherapy.

Although none of the statistical tests for the other variables reached the proposed level of significance, inspection of the data indicated a slight but non-significant trend in the direction of the leading psychotherapy.

122 pages. \$2.00. Mic 57-2905

THE MEASUREMENT OF SUPERVISORY ATTITUDES: AN EXPLORATORY STUDY

(Publication No. 21,094)

René V. Dawis, Ph.D.
University of Minnesota, 1956

Adviser: Donald G. Paterson

Two scales were developed to measure attitudes toward employees. Two differing methods of scale construction were used: one method, patterned after the construction of the Minnesota Teacher Attitude Inventory, utilized external criterion groups to select items; the other, more conventional, method utilized a criterion of internal consistency to select items.

Because adequate criterion groups were difficult to obtain from the supervisory population within the time available to the author, non-supervisory subjects were used in item selection. For external criterion groups, industrial relations personnel were chosen as subjects assumed to hold more favorable attitudes toward employees,

while professional engineers were chosen as subjects assumed to hold less favorable attitudes toward employees. These assumptions were based on the "people-orientedness" of the respective occupations. The criterion groups were selected by means of the Strong Vocational Interest Blank. A total of 105 industrial relations personnel who scored high on the Personnel Director key and low on the Engineer key of the Strong Blank, and 99 professional engineers who scored high on the Engineer key and low on the Personnel Director key were finally chosen as subjects. Thirty-five items which differentiated between the groups were selected from a 150-item pool for inclusion in a scale (the E-Scale). A scoring key was devised to maximize the difference between the groups. Because of time and financial limitations, cross-validation of the E-Scale was not possible. Corrected split-half reliability for the scale was .84.

The data on these same groups were utilized to develop an internally-consistent scale (the I-Scale) using the "scale-value-difference" technique. A Likert-type key (with scoring weights determined *a priori*) was used for scoring purposes. Thirty-four items which differentiated between high-scoring and low-scoring groups (determined on the basis of total scores) were selected from the same original 150-item pool for inclusion in the I-Scale. Corrected split-half reliability for the scale was .85. The two methods of scale construction resulted, however, in the selection of different items as well as different "scored" responses.

To test the usefulness of the scales as aids in predicting supervisory efficiency, scores on the scales were used in an attempt to differentiate between 37 supervisors who were rated by their superiors as belonging to the "upper half" in terms of over-all efficiency and 34 supervisors rated as belonging to the "lower half". The scales failed to differentiate one group from the other. The scales also failed to differentiate between nine supervisors who were rated by their superiors as being "considerate" in their handling of subordinates and six supervisors rated as being "tough" and "hard-driving" in their handling of subordinates. In these investigations, corrected split-half reliabilities of the scales dropped to unsatisfactory levels: to the .60's for the E-Scale and the .70's for the I-Scale.

The present investigation may be regarded as exploratory but as opening up a much needed type of study designed ultimately to appraise the "consideration" factor found by Shartle and others to be of great importance in the handling of human relations in industry.

156 pages. \$2.05. Mic 57-2906

THE RELATION OF QUANTITY OF INFORMATION TO QUALITY OF SOLUTION OF A PRACTICAL FIELD PROBLEM

(Publication No. 21,788)

Leo S. Goldstein, Ph.D.
Columbia University, 1957

Chairman: Irving Lorge

This study was designed primarily to test the hypothesis that an increase in quantity of information about a

problem will lead to an improvement in the quality of solution.

Subjects. One hundred and sixty-five AFROTC students, members of the Air Science I and II classes at Manhattan College, served as subjects for this study. The group was rather homogeneous with respect to sex, age, and intelligence.

Materials. The Mined Road problem, a practical field problem, was adapted for use in this investigation from a similar problem developed by the OSS during World War II. Basically, the problem deals with a group of five men, in enemy-occupied territory, who have to cross a road planted with supersensitive mines, in order to make their escape. Two treatments and two methods of presentation of the problem were developed.

The "minimum" treatment contained only that information deemed necessary to permit a variety of solutions to the problem. The "augmented" treatment consisted of this "minimum" information plus additional information which, if used, would produce a more elegant solution.

At the verbal level of presentation, a written description of the problem was given the subjects. A set of five photographs of the Mined Road problem, as it was constructed in the "actual real" situation, was given the individuals tested at the photographic level of presentation, in addition to the written description.

Procedure. The subjects were tested, en masse, in a one-hour session at Manhattan College. Forty-four individuals received the problem in its "minimum"-verbal form; 43 received the "augmented"-verbal form. For each of the two treatments at the photographic level of presentation, 39 subjects were tested. All solutions were originally scored either "pass" or "fail," on the criterion of workability. A score representing quality of solution, based on the Quality Point Scoring method developed by the Lorge research team, was then given each solution.

Results. Comparison of the "augmented" treatment solutions with those of the "minimum" treatment revealed no significant differences either in percentage of "pass" solutions or in quality point score. Those individuals tested at the verbal level of presentation had a significantly higher QPS than those tested at the photographic level. However, there was no significant difference, between levels, in the percentage of "pass" solutions.

When the results of this study were compared with those of the Lorge investigation significant differences were found in the percentage of "pass" solutions and the QPS. In both instances, the difference was in favor of those subjects who were given at least the "minimum" amount of information necessary to solve.

Analysis of the Lorge subjects' protocols indicated that at both levels of presentation information less than the "minimum" was elicited.

Conclusions. The finding of no significant difference in quality of solution, between the "minimum" and "augmented" treatments, makes this study's major hypothesis untenable. Information more than the "minimum" does not lead to an improvement in quality of solution. However, the hypothesis is supported when a comparison of results is made with the Lorge study. More information (at least the "minimum") does lead to a better quality of solution.

The analysis of the Lorge protocols indicates that individuals do not know how to ask questions. It is suggested that proper use of the questioning technique be taught more fully in the classroom.

The results of this present study also indicate that individuals have difficulty in interpreting photographs. The suggestion is made that the use of visual aids, such as photographs, charts, and maps, be accompanied by a full and complete explanation of the details involved.

87 pages. \$2.00. Mic 57-2907

A STUDY OF CREATIVITY AND THE SELF-ATTITUDES AND SOCIABILITY OF HIGH SCHOOL STUDENTS

(Publication No. 21,789)

Leah Ann Green, Ph.D.
Columbia University, 1957

Chairman: Dr. A. Jersild

Problem

The personality characteristics of creative individuals are subject to wide speculation, but limited research. This study attempted to probe the self-attitudes and sociability of high school students nominated by their teachers as creative and non-creative, in order to discern any group differences.

Hypothesis

High school students selected as creative in comparison with equally able high school students selected as non-creative will reveal more favorable (a) self-attitudes, (b) sociability.

Procedure

In order to test the preceding hypothesis the following steps were employed:

1. Teacher-nomination of creative and non-creative students in honor and special art and music classes were obtained. Nominations were made following a training session for the teachers. A list of characteristics of creative performance, derived from an analysis of "critical incident" descriptions of creative and non-creative student behavior by other high school teachers, was used as criterion.
2. A test battery (Attitude Inventory) was administered to the nominated students. The battery consisted of measures of:
 - self attitudes: a modification of Bills' Index of Adjustment and Values
 - sociability: the "Social Adjustment" subtest of the Bell Adjustment Inventory; sociometric choices.
 - socio-economic factors: parental occupation; parental education
 - personal background: autobiographical section; selection of "Three Wishes."
3. Background data on intellectual factors were collected from the school records. These consisted of:
 - I.Q.: Pintner
 - educational achievement: Iowa Tests of General Educational Development.

Population

The subjects were 126 students in 4th and 6th term honor and special classes in a large New York City

academic high school. All had been nominated by their teachers as creative or non-creative.

Treatment of the Data

The data were subjected to an analysis of variance. The creative and non-creative groups were divided according to sex and term. This resulted in eight unequal subgroups, which required an analysis of variance of cell means.

In addition, correlations between creativity and its variables were computed.

Results

1. The self-attitude evaluations (including Self-Concept, Ideal-Self and Self-Ideal discrepancy) of the students nominated as creative did not differ significantly from those of the students nominated as non-creative. 2. There was a significant sex difference in the Ideal-Self (or aspiration level) estimate of the students, with the boys' scores significantly lower. 3. The social confidence scores and peer-nominations of creative students were greater than those of non-creative students. 4. The creative boys were significantly superior on intellectual measures to the non-creative boys. 5. The intellectual measures of the boys were significantly superior to those of the girls. 6. The parental education level of the creative group was significantly higher than that of the non-creative group.

Conclusions

1. There does not appear to be a difference in the self-attitudes of creative students when compared with non-creative students. 2. Creative students emerge with a higher social confidence and social attractiveness. 3. There is a tendency for intellectual differences to appear when creative boys and non-creative boys are compared. This difference may be related to bias in the teacher-nominations, rather than to actual creative functioning. 4. The differences that appear in parental education suggest that the creative students may have some cultural advantages at home that are not shared by the non-creative students. 5. In general, the stereotype of the withdrawn, self-rejecting, creative student does not seem to be justified by the results of this study.

141 pages. \$2.00. Mic 57-2908

PATTERNS OF PERSONAL PROBLEMS OF ADOLESCENT GIRLS

(Publication No. 21,826)

Richard Edward Schutz, Ph.D.
Columbia University, 1957

Chairman: Robert L. Thorndike

The purpose of the study was to determine the pattern or structure underlying the personal problems which adolescent girls recognize and are willing to report on a problems check list. This pattern was investigated by extracting homogeneous clusters of items from the inventory.

The Billett-Starr Youth Problems Inventory, Senior Level, was administered to a sample of white girls attending the tenth or eleventh grade in two predominately mid-

dleclass, urban, Florida high schools. The cluster analysis was based on 500 cases. An analysis of variance of the subjects' scores in the eleven areas of the Inventory showed that the girls marked an equal number of problems regardless of the school they attended or their grade in school.

A sample of 156 items from the Inventory was selected as variables to be included in the cluster analysis. The items selected have the following characteristics: (1) they are included in both the Junior and Senior level of the Inventory; (2) they have been rated as "very serious" or "moderately serious" problems by a panel of twenty guidance specialists; (3) they were marked by at least five per cent of the subjects in the sample. An attempt was made to select a sample of items which would be representative of the eleven areas of the Inventory and which would include as many items as possible which have counterparts in other published problems check lists.

The cluster analysis was performed using the Loevinger, Gleser, and Dubois method. Three clusters were extracted and designated as follows:

Cluster I - General personal anxiety and insecurity
Cluster II - Tension concerning relationships with others

Cluster III - Difficulties in getting along with parents

The clusters have a Kuder-Richardson Formula 20 reliability of .94, .71, and .81 respectively. An abbreviated Cluster I, comprising the 37 items with the highest item-cluster correlations, has a reliability of .90. The items in Cluster I and II cut across every area of the Inventory. Cluster III represents a purification of the "Home and Family Life" area. The clusters are positively related, the intercorrelations ranging from .34 to .67.

A subsidiary investigation was conducted to determine the factorial purity and reliability of clusters yielded by the Loevinger, Gleser, and Dubois method. A factor analysis was performed of the abbreviated Cluster I and of Clusters II and III. Single centroid factors accounted for 80 per cent of the common factor variance associated with Cluster I, 60 per cent of the common factor variance of Cluster II and 85 per cent of Cluster III.

A cross-check was made of the reliabilities of the clusters, applying Kuder-Richardson Formula 20 to the results of a sample of subjects from the same population. There was no drop in the reliabilities of Clusters I or III. The reliability of Cluster II dropped from .71 to .63, a statistically significant difference.

The implications of the findings for the theory and measurement of adolescent problems was discussed. The composition of the clusters does not correspond closely to any of the theoretical frameworks which have been proposed for classifying adolescent problems. The findings suggest that a single dimension of personal anxiety or insecurity underlies many of the manifest problems which theorists have used several dimensions to explain.

The fact that two of the clusters cut across several areas of the Inventory indicates that classifying problems check list items under the traditional functional or activity categories is for the most part a purely arbitrary procedure. The current functional categories may, however, have some value in suggesting foci for educational or counseling action. The clusters isolated in the study may be of potential value in screening adolescents with adjustment difficulties. Further research was suggested which would extend the generality of the results of the study.

78 pages. \$2.00. Mic 57-2909

A QUANTITATIVE STUDY OF THE GELB EFFECT

(Publication No. 21,037)

Edward Charles Pereira Stewart, Ph.D.
The University of Texas, 1957

Supervisor: Professor Harry Helson

If a black disk against a black background is illuminated by a bright light it appears almost white; but if a small, white stimulus is placed on the disk, it changes to black (Gelb effect). Some writers deny this phenomenon is due to contrast. Measurements show the darkening of the disk is a linear function of the position of the white stimulus, being greatest at the center, and a growth function of its size. The Gelb effect is therefore a case of lightness-contrast which can be triggered by relatively small contrasting stimuli. 77 pages. \$2.00. Mic 57-2910

PSYCHOLOGY, CLINICAL

CHILDREN OF MULTIPLE SCLEROTICS: THEIR PSYCHOLOGICAL CHARACTERISTICS

(Publication No. 21,936)

Sara Hayes Arnaud, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor A. William Hire

The purpose of this study was to investigate certain psychological characteristics of children who have been exposed to the type of family disruption that occurs when a parent is chronically ill and remains in the home. The specific illness focussed upon, as a representative of this class of disease, was multiple sclerosis (M S), a chronic, progressively disabling neurologic disorder that strikes the young adult population in an apparently random way.

General Hypotheses

On the basis of theoretic considerations of the psychological situation of a child exposed to chronic parental illness and from the findings in a preliminary investigation, it was hypothesized: (A) that in comparison with children from homes without chronic illness, children of multiple sclerotics would show higher levels of general anxiety, body concern, dysphoria, hostility, constraint in interpersonal relations, dependency longings, and higher incidence of a pattern of apparently precocious, but basically false, maturity; (B) that in children of M S patients, the false maturity pattern would occur (1) more often in those aged 9 to 16 years than in those 8 or younger and (2) within the former age group, more often in girls than in boys; (C) that among 9 to 16 year old children of M S patients, levels of dependency longings would be higher in those who exhibited the false maturity pattern than in those who did not.

Method

The experimental (or M S) sample, 60 boys and girls,

consisted of all available children of patients currently attending an M S clinic, who were between 7 and 16 years old, of normal intelligence, and living with both parents. The affected parents had had M S in moderate to severe degree for from three to 17 years.

The control sample was made up of 221 boys and girls, comparable to the M S children except in their experience with chronic illness.

Individually administered Rorschachs were used to assess the key personality characteristics, each of which was defined in terms of a number of Rorschach indicators associated with its presence. Based on his Rorschach performance, every subject received a score for each psychological category, consisting of the number of indicators for the given category that fell beyond specified critical levels. The category of false maturity was scored as present or absent on the basis of an interlocking pattern of indicators. Comparisons between M S and control samples, as a whole and at three age levels, and between sex subgroups were based on chi-square analyses of respective frequency distributions of scores for each category.

Results

Hypothesis A was confirmed for all variables (P ranging from $<.01$ to $<.001$) but general anxiety ($P < .10$); in the latter category, the expected findings were verifiable only between the ages of 7 and 12 years ($P < .05$). Also confirmed were hypothesis B-2 ($P < .05$) and hypothesis C ($P < .01$), but hypothesis B-1 was not, although the proportion of incidence was in the expected direction.

Conclusions

Among 7 to 16 year old children, experience with a chronic, disabling illness in a parent who remains in the home tends to be associated with heightened levels of body concern, dysphoria, hostility, interpersonal constraint, dependency longings, increased incidence of a false maturity reaction, and, between the ages of 7 and 12 years, with a heightening in general anxiety. Among 9 to 16 year olds in this family setting the false maturity pattern tends to be accompanied by enhanced dependency longings and to occur more often in girls than in boys.

Age and sex differences in how these variables were manifested appear consistent with certain aspects of general and psychoanalytic theory.

251 pages. \$3.25. Mic 57-2911

TRANSFERENCE IN THE RATINGS OF PHOTOGRAPHS BY NORMALS AND NEUROTICS

(Publication No. 21,998)

Martin Donald Capell, Ph.D.
University of Utah, 1957

Chairman: Dr. Ernst G. Beier

This study concerned the testing of a psychoanalytic theory of transference as applied to projective technique theory. Four hypotheses were deduced:

1. Neurotic males should show a greater similarity between the scale intercorrelation matrices obtained from

ratings of two different sets of photographs of women than would normals.

2. The degree of structure in these matrices, as evidenced by the average absolute correlation, should be higher for the neurotics.

3. If normals rate nude photographs, the group correlation matrix should be more similar to the one obtained from the ratings of clothed women by neurotics than to the one obtained from the ratings of clothed women by normals.

4. For normals, the average absolute correlation should be higher in rating nudes than in rating clothed women.

Fifteen neurotics and 15 normals sorted 32 photographs of clothed women into two equal sets, "Mothers" and "Unmarried Women." Each judge then rated each photograph on seven bipolar scales. Judges rated their own mother and wife (or girl-friend). The normals then rated 16 photographs of nudes.

For each judge, scale intercorrelation (R) matrices were calculated for each of the photo sets. None of the hypotheses were sustained. The groups and photo sets were compared on mean ratings in analyses of variance. The ratings of the judge's mother and wife were also analyzed. A "Favorability Index," derived from the scales, indicated that the "Mothers" photo set was seen more favorably than the "Unmarried Women." Age of the judge was found not to be related to his favorability of reaction to the photographs. Factor analyses, for each group, of the clothed women matrices indicated a similar factor structure. The two groups were compared in the choice of particular photographs as "Mothers" or "Unmarried Women," with little difference found.

The consistent finding in all of the comparisons was a lack of difference between the two groups. The following major conclusions were drawn:

1. The suggested theory does not appear tenable when applied to ratings of photographs of women. Assuming that the attitudes of neurotics toward objects differ from those of normals, these attitudes do not appear to "transfer" automatically to photographs of objects, as measured by rating scale techniques.

2. The conceptualization of neurotics-in-general as a homogeneous group behaviorally is questionable.

3. The photographs appeared to elicit culturally derived attitudes. The same tendency was noted in the ratings of the judge's mother, suggesting that the nature of the testing situation may underlie the cultural attitude in ratings. The need for consideration of cultural background in the interpretation of projective test material is suggested.

Limitation of the Conclusions

The conclusions are necessarily limited by the size of the sample of subjects, and by the lack of precision inherent in nosological classification. Decisions regarding specifics in the methodology were often made on the basis of judgment alone; alternative choices would perhaps have yielded different results. The relatively homogeneous and unique cultural background of the subjects makes generalization to other populations difficult.

100 pages. \$2.00. Mic 57-2912

AN INVESTIGATION OF THE STABILITY OF SOCIAL SENSITIVITY AND ITS RELATIONSHIP TO VERBAL BEHAVIOR

(Publication No. 21,988)

Robert Nicholson Dorsey, Ph.D.
Louisiana State University, 1957

Supervisor: Professor Irwin A. Berg

The purpose of this study was to investigate the stability of Social sensitivity and its relation to verbal behavior. The "Modified Dymond Scale" was used as a measure of Social sensitivity. The Bales system of categorizing behavior was used to record the verbal behavior of the subjects.

Thirteen leaderless groups made up of 5 persons each, were used in Phase 1 of the investigation. Twelve leaderless groups made up of 4 and 5 persons, were used in Phase 2.

1. They behaved differently in their rating behavior. That is, they tended to rate every one on all the scales in the same manner as they rated themselves.

2. The subjects in this study tended to rate themselves the same when placed in new groups. Other studies report that subjects tend to change their self-ratings when placed in new groups.

3. The verbal behavior of the leaders was atypical when compared to other groups. Other studies indicate that leaders tend to have a higher proportion of verbal behavior categorized in the task area.

Such conditions are nearly ideal for facilitating the phenomenon of response set (14) (19). Instead of rating others on their actual traits the subjects turn from external cues that are ambiguous and threatening to internal cues that are safer. Future studies utilizing the techniques outlined herein might find it extremely valuable to investigate the concept of response set.

One of the more important empirical findings of this study concerns the hypothesis that the ability to predict others' responses facilitates interaction. Previous writers (26) (29) have not been clear in defining how the predictions should be made. The predictions may be made on the basis of projection, or on the basis of Social sensitivity.

If one accepts the author's definition of rating others the same as self as projection and leadership as an index of adjustment, this study indicates that predicting others' behavior on the basis of projection, does not facilitate verbal interaction. 86 pages. \$2.00. Mic 57-2913

THE STABILITY OF THE SELF-CONCEPT IN ADOLESCENCE

(Publication No. 19,742)

Mary Engel, Ph.D.
George Peabody College for Teachers, 1956

Major Professor: Nicholas Hobbs

The purpose of this study was to investigate the stability of the self-concept of eighth and tenth grade subjects

over a two year period. An attempt was made to shed light on the relationship between the stability of the self-concept, the quality of the self-concept and adjustment.

The self-concept was defined as an organization of perceptions about the self, admissible to awareness.

Method of Investigation

Eighty-nine eighth grade subjects and sixty-one tenth grade subjects were tested in groups, once in 1954 and again in 1956. The battery included the Self-Concept Scale, paper and pencil Q-sort type, and a peer rating scale, both developed for use with adolescents. Three scales of the Minnesota Multiphasic Personality Inventory, a teacher rating scale and the Verbal Subscale of the Differential Aptitude Test were also used.

Hypotheses

Predictions concerned the stability of the self-concept, the relationship of the stability and the positiveness of self-concept, the relationship between positiveness, stability and various measures of adjustment, the relationship of positiveness of self-concept and grade averages with intelligence held constant. Some age and sex differences with regard to stability of the self-concept were also hypothesized.

Summary of Results

The two year study of the stability of the self-concept in adolescence resulted in the following conclusions that were predicted:

1. The stability of the self-concept of adolescents was demonstrated by an overall item-by-item correlation of .53 between Q-sorts obtained in 1954 and in 1956, with an instrument of which the ten day test-retest reliability was .68.
2. Subjects whose self-concept was negative in 1954 were significantly less stable in self-concept than subjects whose self-concept was positive in 1954.
3. Subjects who maintained their negative self-concept over the two year period gave evidence of significantly more maladjustment than subjects who maintained their positive self-concept, when maladjustment is defined as high scores on scales Pd and D of the MMPI.
4. Subject who shifted in positiveness of the self-concept in the negative direction, i.e. showed less regard for themselves on the Q-sort on retest, also shifted toward significantly more maladjustment on scales Pd and D of the MMPI.
5. Subjects who shifted in positiveness of the self-concept in the positive direction, i.e. showed more regard for themselves on the Q-sort on retest, also shifted toward significantly more adjustment on peer-ratings.

The following findings were not predicted but have heuristic value.

1. The mean positive self-concept score of the eighth grade group that left the school by the time of the retest was significantly lower in 1954 than that of the remaining group.
2. Teacher ratings were indicative of significantly more maladjustment for those eighth and tenth graders who left school by the time of the retest, whereas
3. Estimates of intelligence, (DAT Verbal Sub-test) did

not discriminate between the attrition and the remaining group.

4. The positive self-concept scores increased significantly between 1954 and 1956 for tenth - twelfth grade subjects, an increase which could not be attributed entirely to the effects of regression, suggesting that there may be an increase of positiveness of the self-concept with age, at this level of development.

169 pages. \$2.25. Mic 57-2914

A VALIDATION STUDY OF THE ORAL EROTIC SCALE OF THE BLACKY PICTURES TEST

(Publication No. 21,974)

Mildred O. Jacobs, Ph.D.

The University of Oklahoma, 1957

Major Professor: Assistant Professor R. G. Cannicott

The purpose of the study was to investigate the validity of a single dimension of the Blacky Pictures Test, the Oral Erotic Scale. The design utilized a correlational study of the relationship between subjects' scores on the Oral Erotic Scale and scores on two separate criteria of orality developed by the experimenter preliminary to the study, a self-rating scale and a perceptual test.

The self-rating scale was based on four aspects of orality described by psychoanalytic theorists and composed of statements categorized by four judges.

The second criterion, the perceptual test, involved tachistoscopic presentations at varying exposure times of 12 pictures of everyday objects, six of which represented "oral cues" and six of which were non-oral in symbolic value. The test was based on the theoretical position that the personality needs of the perceiver determine what is perceived to an increasingly greater extent as the exposure time is decreased. Accurate recognition of "oral cues" at shorter exposure time therefore reflects more intense oral need.

Four preliminary studies, involving 44 subjects, developed experimental procedures which differentiated individuals in terms of their response times to the pictures, produced two sets of pictures matched in terms of difficulty and variability of scores, and demonstrated a significant correlation of $r = .76$ between clinical ratings of orality and scores on the perceptual test.

In the experiment proper a total of 95 subjects were used, 48 high school students and 47 college students. The Blacky Pictures Test, the self-rating scale and the perceptual test were administered to all subjects in groups of 20 to 30 persons.

An analysis of the results revealed no significant relationship between scores on the Oral Erotic Scale and scores on the self-rating scale. It was suggested that this finding was probably due as much to the questionable validity of this criterion as the invalidity of the Blacky Oral Erotic Scale.

An analysis of relationship between the Oral Erotic Scale and the perceptual test revealed several significant correlations, but of a value less than $.50$, a value chosen as minimal for practicable test validity. This was so irrespective of educational level. However, when the total

population was broken down into separate groups on the basis of sex and age, significant correlations as great as $r = .71$ and $r = .62$ were found to occur. In light of the diverse findings, it was concluded that the Oral Erotic Scale of the Blacky Pictures Test appears to be a valid test of orality only for some groups of individuals, and such factors as age, sex, test sophistication and perhaps personality factors unknown from the data at hand may make for certain defensive reactions which may influence, in not entirely predictable ways, the subjects' responses to the test. 95 pages. \$2.00. Mic 57-2915

THE ANTICIPATION OF THE DECLINE OF LIFE AS A FUNCTION OF PSYCHOLOGICAL VARIABLES

(Publication No. 21,638)

Gertrud Maria Kurth, Ph.D.
Columbia University, 1957

Chairman: Laurance F. Shaffer

This study was designed to investigate at what age decline of life is expected. Decline of life was defined as loss of capacities in the areas of flexibility, of physical and sexual prowess, and in the combined areas. On the basis of prevailing age grading practices, it was hypothesized that the variables of self-esteem, age, culture, and socio-economic status determine decline expectancy.

The following hypotheses were formulated:

1. The lower self-esteem, the earlier is decline of life expected.
2. Younger people expect decline of life in all areas earlier than older ones.
3. In the Jewish culture, decline of life is expected earlier than in the American Protestant culture.
4. Members of the lower middle class expect decline of flexibility earlier and of sexual prowess later than members of the upper middle class.
5. Members of the lower middle class expect decline of physical prowess later than members of the upper middle class.

A sample of 128 white, male subjects, was broken down as follows: 64 Jews, 64 Protestants; 64 of upper, 64 of lower middle class status as measured by the Warner-Meeker-Eells Index of Social Status; 32 each of 20-29, 30-39, 40-49, and 50-65 year olds.

Two new instruments were used:

The Decline Expectancy Scale (DES), a self-administering, projective rating scale, was devised in the disguise of an opinion questionnaire. Thirty items present problems of loss of capacities due to age. Decline expectancy is measured by the sum of age scores.

Jervis' Self Description Inventory (SDI) consisting of ninety statements descriptive of the self and the ideal self, is a self-administering rating scale which measures self-esteem by the sum of discrepancy scores.

The hypothesis relating decline expectancy to self-esteem was tested by means of product moment coefficients of correlation. The results did not confirm the hypothesis.

All other hypotheses were tested by means of a factorial design analysis of variance. Decline expectancy was not found to rise from decade to decade. However, it was

found to be significantly lower before than after 40 years of age. This result supported the hypothesis. Jews showed a significantly higher decline expectancy in the sexual prowess area than did Protestants. Members of the lower middle class expected decline of life in all areas and total decline significantly earlier than did members of the upper middle class. The results support the hypothesis relating to flexibility only. None of the other hypotheses were confirmed.

On the basis of these results, the following conclusions were drawn:

White males of both Jewish and Protestant cultural background under 40 years of age expect decline of life significantly earlier than do those over 40 years of age.

Jews expect to maintain sexual prowess significantly longer than do Protestants. This finding, however, may be due to characteristics of the population sampled in the present study and hence should not be generalized.

Socio-economic status emerged as the most potent variable in determining decline expectancy. In all areas investigated, members of the lower middle class expect decline of life significantly earlier than do members of the upper middle class.

Implications of these findings for the measurement of self-esteem, for the influence of religious teaching upon attitudes toward sex, for the development of vital ego functions, particularly of the sense of time, and for specific and general problems of adult psychology were discussed. 120 pages. \$2.00. Mic 57-2916

SELF-ACCEPTANCE AND THE MECHANISM OF IDENTIFICATION: A Q-Sort Investigation of the Relationship Between Levels of Self-Acceptance, Character, Parental Descriptions and Identification Patterns in College Women

(Publication No. 21,713)

Robert C. Melniker, Ph.D.
New York University, 1957

Chairman: Professor Brian E. Tomlinson

This study investigated the relationship between high and low levels of self-acceptance, and patterns of character, parental descriptions and identification in college women. The basic hypotheses were that (1) the group of high self-acceptance subjects (Group A) are differentiated from the group of low self-acceptance subjects (Group B) in terms of character patterns, that (2) the two groups are differentiated in terms of parental descriptions, and that (3) the two groups are differentiated in terms of patterns of identification with the parents.

The population consisted of two groups of ten subjects each, derived from one hundred volunteer undergraduate women students at Adelphi College. The Index of Adjustment and Values was used to measure high and low levels of self-acceptance.

A Q-sort was prepared, based on Horney's description of the expansive, self-effacing, resigned and normal character patterns (coded E, S, R and N, respectively). Three judges evaluated the sixty Q-items in the Q-test, and statements not acceptable to any of the judges were revised.

Each subject sorted the Q-statements four times as follows: self, ideal-self, father description and mother description. The statistical treatment was based on the scores obtained by each group, for each sort, in the four basic Q-categories.

Each group was examined for patterns of character, parental descriptions and identification, in terms of significant variation from chance expectancy at the .01 level, using Friedman's formula for chi-square. The groups were also compared for significant similarities or differences in terms of character, parental descriptions and identification.

Results

The groups were significantly differentiated in terms of parental descriptions. Group A described the father as low and the mother as high in self-effacing trends. Group B rated the father high in resigned and low in expansive qualities and the mother as high in expansive and low in self-effacing and resigned trends.

The groups were differentiated in terms of self-description. Group A rated significantly high in normal and low in self-effacing characteristics, while Group B rated high in self-effacing and low in expansive qualities.

The groups were significantly differentiated in terms of identification. Group A showed significant congruence between the self and the father in low S weightings, and congruence between the ideal-self and the mother in high S scores. Group B demonstrated congruence between the self and the father in low E weightings, and between the ideal-self and the mother in low R and S scores.

Examination of the significant shifts between the self and ideal-self ratings revealed that Group A showed a diminution in E and an increase in S. Group B showed a decrease in R and S, and an increase in N.

Conclusions

The Q-sorts were found to differentiate between women who rated high and those who rated low in self-acceptance, and seemed especially helpful in pointing up underlying wishes pertaining to self-characteristics. This appeared to be valuable in helping to elicit and to identify trends in the identification process.

Both groups demonstrated conscious identification with the father but expressed an underlying wish to be more like the mother. Thus, both high as well as low self-acceptance women in this study (as measured by the Index of Adjustment and values), demonstrated some underlying dissatisfaction with the self picture in terms of an inadequately developed identification with the mother.

The shift for the group of high self-acceptance women between the self and ideal-self sorts, suggests the need for further exploration of the nature of the inner dissatisfaction with the self as elicited by the Q-tests, despite the very high scores in self-esteem obtained on the Index.

174 pages. \$2.30. Mic 57-2917

A COMPARISON OF MENTAL DETERIORATION AND INTELLECTUAL FUNCTIONING IN SENESCENT AND BRAIN-DAMAGED SUBJECTS

(Publication No. 22,000)

Ray Willard Olson, Ph.D.
University of Utah, 1957

Chairman: Moroni H. Brown

Six tests of the Wechsler-Bellevue Intelligence Scale, Form I, were administered to 32 subjects who were brain damaged before the age of one year, 34 people who were brain damaged as adults, and 100 senescent subjects who were between the ages of 60 and 89.

All 66 of the brain-damaged subjects were classified as being encephalopathic by a neurologist on the basis of historical and neurological medical data. All of the 32 subjects in the early brain-damaged group were living in the community. The 17 males in the late brain-damaged group were tested in a VA Hospital, and the 17 females in this group were tested at a State Hospital. The 100 senescent subjects were drawn from charity and private homes for the aged, as well as from the community, in an attempt to make this group as representative of the old-age as possible.

An additional 465 cases, ranging in age from 10 to 59 years, were drawn from the files of the University of Utah Psychological Clinic, giving a total group of 565 subjects for which deterioration ratios were calculated so that an approximation of normal deterioration expectancies could be made.

The results of this investigation indicate that the following conclusions justifiably may be drawn with reference to the samples studied:

1. For the group of 32 subjects brain damaged before the age of one year, a significant difference was found when their mean Verbal and Performance IQ scores were compared, indicating that the verbal abilities were significantly higher than the nonverbal intellectual abilities. Because of the significant Verbal-Performance difference, the hypothesis is rejected that there is a generalized impairment of the verbal and nonverbal intellectual skills in the early brain-damaged group.

2. For the 34 subjects brain damaged later in life, a significant difference was found when the mean Verbal and Performance IQ scores were compared, showing that the verbal abilities were significantly higher than the nonverbal intellectual skills. For this group, the hypothesis is accepted that subjects who received brain injuries later in life show little verbal impairment, but their nonverbal capacities were significantly lowered when compared to their verbal abilities.

3. For the 32 subjects who were brain damaged early in life, no significant sex differences were found with respect to their functioning on the Wechsler-Bellevue Scale.

For the 34 subjects who were brain damaged later in life, significant sex differences, favoring males, were found on three of the six tests--Comprehension, Information, and Picture Arrangement.

4. Highly significant differences were found between the deterioration scores calculated for the senescent subjects, and those of the early brain-damaged group. Therefore, the null hypothesis that mental deterioration accompanying old age will not differ significantly from mental

impairment in subjects brain damaged early in life was rejected. The senescent subjects showed significantly higher deterioration scores.

5. Significant differences were found between the senescent deterioration scores and those of the late brain-damaged subjects. The hypothesis that mental deterioration accompanying old age will not differ significantly from mental impairment in subjects brain damaged later in life was rejected. The senescent subjects again showed significantly higher deterioration scores.

Only to the degree that the three groups used in this study are representative of larger populations, are the findings of this investigation applicable to generalizations. The validity of the conclusions drawn from this investigation can only be determined by subsequent studies. Until such studies are available, the findings of this investigation must be restricted to the two encephalopathic groups and the senescent group used in this investigation.

130 pages. \$2.00. Mic 57-2918

**THE USE OF FINGER PAINTINGS IN
DIFFERENTIATING EPILEPTICS AND PARANOID
SCHIZOPHRENICS: AN EVALUATION OF THE
IDENTIFICATION HYPOTHESES UNDERLYING
THE SZONDI TEST**

(Publication No. 21,715)

Richard Arthur Pasewark, Ph.D.
New York University, 1957

Chairman: Professor Edward L. Kemp

The purpose of the study was to investigate the identification rationale of the Szondi Test.

A Finger Paint Test parallel to the Szondi was constructed. Forty-eight finger paintings were secured from psychiatric patients carrying the same diagnosis as those patients represented in the Szondi plates. Six patients from each of the following nosological classifications were utilized: (1) homosexual; (2) sadist; (3) epileptic; (4) hysteric; (5) catatonic schizophrenic; (6) paranoid schizophrenic; (7) depressive; and, (8) manic. The Finger Paintings were photographed in color and printed. The prints were divided randomly into six series. Each series contained a single painting representing one of the eight diagnostic categories, as in the Szondi Test.

The Szondi Test and the Finger Paint Test were administered to thirty epileptic and thirty-two paranoid schizophrenic patients. All subjects were of at least average intelligence and the two groups were equated for sex distribution, age, education, and intelligence.

It was hypothesized that, if selection on the Szondi was determined by the subject's identification with drives or characteristics associated with the eight diagnoses and communicated in the Szondi Test, the selections on both the Szondi and Finger Paint Tests should evidence a similar patterning. Treated by means of χ^2 , the obtained data failed to support this hypothesis. In both the epileptic and paranoid groups, the distributions of "like" and "dislike" choices differed significantly on the two tests. It was further found that neither the Szondi Test nor the Finger Paint Test was able to differentiate the epileptic

group from the paranoid group. It was concluded that neither test conveyed the elements purported by Szondi or, if they did, such elements failed to differentiate the groups as would be expected theoretically. The results of the present study were discussed in relation to previous research and it was suggested that selection on the Szondi Test depended upon the degree to which the photographs in a particular diagnostic category conformed to the stereotyped conceptualization of that diagnosis; the greater the conformity of the pictures in a classification to the stereotypy the greater the number of "like" selections.

163 pages. \$2.15. Mic 57-2919

**PROBLEMS IN VALIDITY FOR THE COPPLE
SENTENCE COMPLETION TEST AS A MEASURE
OF "EFFECTIVE INTELLIGENCE"
WITH AIR FORCE PERSONNEL**

(Publication No. 22,019)

Robert Joe Piltz, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor George E. Copple

The present study has investigated a new, unstructured, type intelligence test--The Copple Sentence Completion Test (CSCT). The study was concerned with the reliability and construct validity of the test as a measure of "effective intelligence," and with the effects on the CSCT brought about by more structured ("tuition") conditions of administration.

Fifty-nine Air Force officers and airmen were divided, by random procedures, into three approximately equal size groups. Group I had a test and retest CSCT under standard conditions of administration, Group II a standard test and a "tuition" retest, and Group III a test and retest under "tuition" conditions.

Comparisons between the groups showed significantly higher mean CSCT scores where the test is administered under "tuition" conditions. Scores on two conventional type intelligence tests, on a scale of social attainment and quantitative and qualitative scores of problem-solving were also obtained for each subject. Split-half reliabilities of .96 (.98 corrected by Spearman-Brown formula) indicated high interval consistency for the CSCT under either of the conditions of administration.

The study provided the first look at test-retest reliability. Reliability coefficients of .71 and .81 where the CSCT is administered with tuition are reasonably comparable, but suggested slightly higher stability for the CSCT with "tuition."

Significant correlations are found between the CSCT and scores on the two standard tests of intelligence (.33 with the Wechsler-Bellevue and .50 with the Airman Qualifying Examination). Significantly higher correlation of .81 for the "tuition" CSCT with the Wechsler suggests that the test becomes a somewhat better predictor of traditional intelligence factors under these conditions of administration.

The present study provides the first attempt to employ criteria specifically described as relevant to "effective intelligence" to study the validity of the CSCT. Significant

moderate to high correlations are found between the CSCT and scores on the Social Attainment scale and with Qualitative scores of problem-solving performance. Non-significant correlation is found between the test and Quantitative problem-solving scores.

No significant differences are found between correlations for the standard CSCT and the CSCT with "tuition" in predicting the criteria. Trends, however, suggest that the CSCT with "tuition" is a slightly more efficient and inclusive predictor of "effective intelligence."

The CSCT under both conditions of administration employed in the study compared favorably with standard intelligence tests in predicting the criteria of "effective intelligence." Multiple correlations suggested that the CSCT substantially increases prediction of the criteria when combined with either of the standard I.Q. tests.

156 pages. \$2.05. Mic 57-2920

A PSYCHO-SOCIAL STUDY OF GROUP INTERACTION OF PHYSICALLY HANDICAPPED AND ABLE-BODIED CHILDREN

(Publication No. 21,717)

Joy Benjamin Roy, Ph.D.
New York University, 1956

Chairman: Assistant Professor John J. Sullivan

Interpersonal relations between able-bodied and physically handicapped boys were investigated at the Herald Tribune Fresh Air Fund Camp Hidden Valley during the summer of 1955. Twenty-one boys, divided into four tent groups in each of which there were some physically handicapped and some able-bodied, made up the sample. Ten of these boys were able-bodied and 11 physically handicapped. Of the physically handicapped group six were classified as mildly handicapped and five as severely handicapped. The sample ranged from seven to eleven years of age; more than half were Caucasian and about a quarter each were Negro and from Puerto Rico. All the subjects came from New York City and had been referred to the camp by social agencies on the basis of economic need.

A special Thematic Apperception-like test was devised in which children were pictured, some with physical disabilities, some able-bodied, in various social situations. Stories to these nine pictures were elicited from the subjects at the beginning and end of the encampments and were studied for differences and changes in productivity, card preferences and worry-themes. Sociograms were constructed on the basis of peer preferences of the subjects at the beginning of the encampment, after one week and after thirteen days. In addition, observations of day to day interactions for the two-week encampments were recorded and interpreted in terms of dynamic psychological meanings.

All of the subjects showed greatest concern about social acceptance and the fear of physical injury. The camping experience allayed anxiety around racial differences and competitive feelings with peers but increased anxiety around social acceptance and authority; it did not affect anxiety around physical injury.

The mildly handicapped boys were oriented competi-

tively in their social relations; the severely handicapped boys tended to be guarded, withdrawn and to have aggressive fantasies. Initially the severely handicapped were chosen more often by able-bodied, whereas after thirteen days they were chosen more often by the mildly handicapped. The mildly handicapped were selected on initial formation of the groups equally by severely handicapped and able-bodied; after thirteen days both able-bodied and severely handicapped were still equally accepting though the severely handicapped were more rejecting. The able-bodied boys at first were chosen more often by mildly handicapped than by severely handicapped; thirteen days later this did not change.

The severely handicapped were rejected by all Negroes and by the severely handicapped Caucasians; the more physically adequate the Caucasian boy, the more accepting he seems to be of severe handicap. The mildly handicapped were rejected by Negroes and Caucasians in each other but accepted in their own racial group. Mildly handicapped boys seemed to be involved in triangles of friendship, while Puerto Rican boys seemed to be involved in triangles of hostility.

Exposure to boys with physical handicap underscored the subjects' fear of physical injury, although a living experience between physically handicapped and able-bodied did not alter their concerns in this area. The mildly handicapped and Puerto Rican boys appear to have been aggressive in their striving for social acceptance; the severely handicapped and Negro boys tended to be more passive and withdrawn in their orientation. The former group more often than the latter were perceived with hostility by the group.

457 pages. \$5.85. Mic 57-2921

ATTITUDES TOWARD THE SELF AND OTHERS OF A GROUP OF PSYCHOANALYSANDS.

A Determination of the Relationship Between Attitudes Toward Self and Toward Others and Human and Human-Like Responses on the Rorschach.

(Publication No. 21,718)

Irving Herman Silver, Ph.D.
New York University, 1957

Chairman: Professor Avrum Ben-Avi

The study is concerned with an investigation of ego attitudes of a group of psychoanalysts. It was hypothesized that the Rorschach clinician and the psychoanalyst treating a subject will arrive at comparable determinations and evaluations of a subject's attitudes. Specific attitudes of the subjects were determined and evaluated through the interpretation of human and human-like responses to the Rorschach. Psychoanalysts treating them also judged the subjects in terms of these specific attitudes.

The Rorschach method of personality investigation is an holistic technique wherein the data are usually treated and interpretations arrived at in terms of the interrelationships existing among the various scoring categories. However, in recent years clinicians have made greater use of the content features of the protocol - especially the human response category - in making interpretations

concerning specific attitudes or defenses of a subject. Although much is written about "character" as derived from Rorschach protocols, few, if any, specific investigations have been carried on in this area, despite its importance for the development of psychotherapeutic formulations.

The subjects for the study were twenty-eight psychoanalysts, men and women between the ages of twenty and forty years. All were of at least average intelligence, and without a diagnosable neurological disorder. Each of the subjects was examined individually by the researcher. Except to establish rapport for purposes of test administration, no data other than test responses were sought or elicited.

The human and human-like responses were taken verbatim from the protocols and given to two experienced psychologists who, acting as judges, applied five scales to the data. The final scores for the scales were used in developing interpretations concerning the specific attitudes under investigation. Also used for interpretive purposes were three formally scored Rorschach characteristics: percent human responses; percent human detail responses; and, percent human-like responses.

Two psychoanalysts treating the subjects in individual psychoanalytic therapy responded to a ten part Questionnaire, subsequent to at least twenty interviews with each of their patients. Each question was related to an attitude being investigated through the Rorschach procedures.

The data were treated statistically with chi-square technique, and, where necessary, supplemented by Fisher's Exact Test. A qualitative approach was also used in the treatment. Descriptions of the subjects, arrived at through an holistic evaluation of the Rorschach scores attained on the procedures used, were compared with descriptions derived from the psychoanalyst Questionnaire.

The statistical results are as follows: while the general hypothesis is not consistently supported, it cannot be rejected. Partial support is reflected in the fact that of eight specific hypotheses, four received statistically significant support. More specifically, the following conclusions may be drawn: the Rorschach clinician and the psychoanalyst will arrive at similar identification and evaluation concerning a subject's suspiciousness; his tendency toward inadequacy or competence in social situations; his tendency toward submissiveness or toward structuring social situations; and, his need to be inactive, or to be active in social situations.

The qualitative treatment of the data indicated that a wider area of agreement existed between the judgments of the Rorschach clinician and those of the psychoanalysts than was suggested by the statistical treatment wherein the data was dealt with in a necessarily atomistic manner.

It is recommended that future research deal with investigations of the tendency on the part of subjects to distort the human characteristics of responses; and the implications of the extent of energy implied in the human movement responses. Further recommendations for research were made.

241 pages. \$3.15. Mic 57-2922

SEXUAL CONFLICT, PERCEPTUAL VIGILANCE AND PERCEPTUAL DEFENSE IN VISUAL PERCEPTION

(Publication No. 22,001)

Richard Lavon Stott, Ph.D.
University of Utah, 1957

Chairman: Dr. Ernst G. Beier

This study was undertaken in order to test two hypotheses derived from psychoanalytic theory: perceptual vigilance and perceptual defense. Perceptual vigilance is defined as a lowered threshold and perceptual defense as a raised threshold to emotionally charged (threatening) stimuli. A basic assumption underlying the theory of defense concerns the ability of the human organism to detect the presence of anxiety-arousing stimuli at an unconscious level of awareness. This unconscious detection is necessary if defensive responses are to serve their hypothesized role of preventing the spread of anxiety to more conscious level of awareness.

A group of 20 male neurotic patients diagnosed as anxiety and conversion hysterics, and evidencing features of repression and sexual conflict, were identified as high sexually conflicted subjects. Twenty married males, having no previous history of divorce, psychiatric illness or treatment, and scoring within the "normal limits" on the MMPI, were identified as the normal control group.

Four pictures were selected as stimuli for each of the subjects. One picture portraying sexual expression, and three pictures portraying neutral behavior were used as stimuli in the perceptual procedures. The four pictures were flashed simultaneously (cross pattern) in a tachistoscope, with the pictures varying in position from exposure to exposure.

In the vigilance procedure the subject was first familiarized with the pictures. Then the pictures were flashed at a level below the recognition threshold, representing a low level of awareness. The subject was asked only to designate after each flash the position of the picture which stood out most. This task was designed to tap unconscious processes in such a way that ego defense mechanisms were not likely to operate and thereby allow the sexual impulse expression in terms of the picture associated with sexual expression. Familiarizing the subject with the pictures was intended to arouse the underlying sexual impulse and its possible threatening nature. The prediction was that subjects with high sexual conflict (patients) should be more sensitive to the sexual picture and choose it as standing out most, significantly more often than the normal control subjects.

In the perceptual defense procedure, the task was changed to asking the subject after each flash to indicate which pictures were occupying various positions in the patterns. Ego functions were brought into play by increasing the time of pattern exposure to a speed above the recognition threshold, representing a relatively high level of awareness, and making the task a conscious ego-involving one of trying to locate by position a specific picture. The prediction was that the sexual picture, because of its ego-threatening (anxiety-provoking) quality, should be correctly located less frequently by subjects (patients) predisposed to avoid or repress sexual impulses than the normal subjects.

The variables of structural qualities, stimulus familiarity, and selective verbal report were controlled in the experimental design.

An analysis of the data showed that:

1. In the perceptual vigilance procedure the patient group showed a higher mean choice for the sexual picture, significant beyond the .01 level.
2. In the perceptual defense procedure the patient group showed a lower mean accuracy in location of the sexual picture, significant at the .01 level.
3. In the perceptual defense procedure the patient group showed a higher accuracy in location of neutral picture 3, significant at the .05 level.

The first finding was interpreted as providing support for the perceptual vigilance hypothesis, in the context of this study.

Although the second finding might be interpreted as consistent with the hypothesis of perceptual defense such an interpretation is weakened by the third finding demonstrating a difference between the groups in locating neutral picture 3.

The third finding was interpreted as possibly stemming from:

- a) a weakness in the method of selecting pictures eliciting equal response,
- b) differential content meaning of the neutral pictures, and
- c) inadequate control of the intellectual variable between groups.

88 pages. \$2.00. Mic 57-2923

GOAL-SETTING AS A PROBLEM IN THE PSYCHODYNAMICS OF OBESITY

(Publication No. 21,932)

Linden D. Summers, Jr., Ph.D.
Syracuse University, 1957

This study attempted to substantiate, through experimental evidence, clinical impressions regarding the unrealistically high level of aspiration in obesity. The population studied consisted of a group (N = 40) of obese adolescent children, averaging 54 percent above ideal weight for their age and height, who were matched for sex, age, grade placement, academic achievement and intelligence (as measured by a group intelligence test) to a group of children of normal weight.

Reality aspects of goal-setting behavior were evaluated by means of the Rotter Aspiration Board and fantasy aspects through a modified TAT, measuring need for achievement. An initial ten trials on the Rotter Board (during which the subject was free to set any estimate with no penalty for failure to reach this goal) was described as the "free condition." Beginning at trial eleven, a penalty score was introduced; the subject was penalized if he failed to achieve his estimate or if he exceeded it, with the intent of forcing the subject's performance into line with his estimates. These latter ten trials were described as "reality-oriented." Various measures taken offered a basis for comparative performances both between the two groups and for each group between the two conditions. Protocols from the five cards of the TAT series were scored for each subject for the presence or absence of Achievement Imagery (AI). Those receiving an AI score

were further analyzed as to the elements making up this Achievement Imagery. Scoring was done by three judges trained to the McClelland system. A sample rescored after three weeks indicated 89 percent agreement with the original scoring.

Conflicting results were obtained on measures of goal-setting on the Rotter Board. The control group performed substantially as predicted. Their response "improved" markedly under "reality-oriented" conditions while the response of the obese subjects deteriorated with the change in the experimental conditions. The apparently realistic performance of the obese subjects under the initial "free" condition actually represented instead a passive acceptance of the procedure without real involvement. Consequently, the obese child showed more unrealistic aspirations when reality as manifested through penalty scores was most pressing. This was explained as an escape into fantasy, ignoring the reality demands of the objective situation. It was suggested that this aspect of goal-setting problems lies on a continuum, the extreme of which research has indicated to be found in schizophrenia. "Reality-orientedness"--the ability to deal with the objective aspects of the situation--was introduced to explain the differences in performance between the two groups.

TAT performance was in the direction hypothesized, with a greater frequency of Achievement Imagery and its scoring elements found more consistently among the obese subjects. A comparison of discrepancy scores from the Rotter Board and the need for Achievement (n Ach) score from the TAT indicated statistically non-significant correlations, whether comparisons were made with D-scores from the two experimental conditions or over the total trials.

Lack of consistency of performance between the two instruments was described as a function of many elements, including inadequate measurement in this study. Analysis of Achievement Imagery by other researchers has suggested varying aspects of achievement motivation ranging from hope of success to fear of failure. The obese subjects used in the present study are apparently a heterogeneous group, ranging along this entire continuum, while the control group is more homogeneous. It was suggested that more refined techniques, identifying various positions along this continuum would offer a practical basis for identifying obese subjects whose excessive intake might be related to their ability to adapt to the demands of reality free of their own fear of failure or hope for success.

175 pages. \$2.30. Mic 57-2924

THE RELATIONSHIPS BETWEEN REAL AND APPARENT MOVEMENT AND RORSCHACH FORM PERCEPTION

(Publication No. 21,933)

Stephen Wells, Ph.D.
Syracuse University, 1957

The purpose of this study was to determine empirically the relationship between two methods devised to assess the ability to identify exogenous and endogenous stimuli. The two methods were:

1. the autokinetic task,

2. the McReynolds Concept Evaluation Technique (CET), modified in its scoring system.

Three hypotheses were formulated and tested. They were stated in terms of the scores yielded by the two methods, and they were based on the assumption that each method employed operations which made available to the subjects each type of stimulus.

In the autokinetic task, real and apparent movement of a light were defined, respectively, as exogenous and endogenous stimulation. In the CET, the form quality of Rorschach concepts served as the indicator of the origin of the stimulus. Good form was defined as being elicited mostly by the shape of the blot, while poor form was considered mostly a product of internal processes.

For the autokinetic task, an apparatus was constructed which presented 20 exposures of a stationary pinpoint of light, as well as 20 exposures of a moving point of light, in fixed random order, to each subject. The movement of the light was designed to simulate the autokinetic sensation. The subject was required to identify each type of movement.

For the CET, a scoring system was devised which measured the subject's conformity with McReynold's standardization group in identifying good forms and poor forms on the Rorschach.

The two methods were applied to seventy-five undergraduate students at Syracuse University. The correlation coefficients between the major scores were positive and significant. Significant relationships were found between these pairs of scores: Identification of real movement and identification of good form; identification of apparent movement and identification of poor form; total movement discrimination and total form discrimination.

Each method yielded split-half reliability coefficients which were deemed high enough to permit the use of the instruments for the testing of hypotheses. The data were further analyzed for factors which influenced the correlation coefficients. The effects of these factors were controlled. All correlations were tested for linearity.

The personality variable which was assumed to be operative in the determination of these scores was reality testing ability. This variable has been defined in the psychoanalytic literature as the ability to discriminate between exogenous and endogenous stimulation. It has also been defined in more general psychological writings as the ability to adhere to norms or standards. This research demonstrated the compatibility of the two definitions, at least insofar as the operations utilized in the experiment were concerned.

Future research in this area suggests the application of these methods to subjects with pathological conditions. It was suspected that psychological illness characterized by loss of reality contact may be reflected in the autokinetic task as well as the CET. Also, certain changes in the experimental procedure, involving the extent of the travel of the point of light and the elimination of Rorschach determinants other than form, were suggested. It was hoped that under these modifications the reliability of the instruments would be improved.

189 pages. \$2.50. Mic 57-2925

PSYCHOLOGY, EXPERIMENTAL

TRANSFER OF TRAINING AS A FUNCTION OF PLACE AND RESPONSE LEARNING

(Publication No. 22,018)

Alfred J. Kraemer, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Leland E. Thune

The point of departure of the present study was the place learning versus response learning controversy. A critical review of the literature indicated that the debate over the relative difficulty of maze learning under "place" conditions and maze learning under "response" conditions has been rather fruitless. A more appropriate comparison of these different conditions of maze learning seemed to be in terms of their transfer effects on subsequent maze learning.

Eighty rats were assigned to four experimental groups and one control group. All animals were given extensive pretraining. The experimental groups were then trained on an elevated T maze, each animal receiving one trial per day for thirty days. Each group was trained under a different set of stimulus conditions. The animals of group I were run under "place-and-response" conditions, which required them to always make the same turn and to always find food in the same place in the room. The maze remained in the same position for all trials and distinct extra-maze stimuli were present. Thus, group I was provided with proprioceptive and with extra-maze cues. Group II was trained under "Tolman-type place" conditions. They too were required to always run to the same place in the room, but rotation of the maze required now a right turn, now a left turn. Again, distinct extra-maze stimuli were present. Thus, group II was provided with extra-maze cues, while proprioceptive stimuli were irrelevant. Group III was run under "Blodgett-type response" conditions. It was trained to always make the same turn in a "homogeneous" environment. Thus, only proprioceptive cues were provided, and extra-maze stimuli were minimized. Finally, group IV was run under "Tolman-type response" conditions. Distinct extra-maze stimuli were present and the animals were trained to always make the same turn. But rotation of the maze required them to run now to one, now to another place in the room. Thus, proprioceptive cues were provided, while extra-maze stimuli were irrelevant and, on some trials, even antagonistic. The control animals received an equal amount of practice on a straight runway in the absence of extra-maze cues.

Transfer of training effects were determined by performance on another single choice point elevated maze (maze B). Each of the original five groups was now divided into two subgroups, one of which learned the second maze under place-and-response conditions, the other under Tolman-type response conditions. The five subgroups now trained under place-and-response conditions, were given a minimum of twenty trials. The others were given a minimum of thirty trials. Animals not reaching a criterion of ten successive correct responses were given additional trials until that criterion was met. All animals again received one trial per day.

The following results were obtained. The various maze

A conditions led to significant variation in the maze A performance of the four experimental groups. The two response learning groups (III and IV) exhibited the poorest maze A performance. Maze A treatments led to significant variation in the performance of the five subgroups trained on maze B under place-and-response conditions. The maze B performance of group III, trained on maze A under Blodgett-type response conditions was significantly superior to that of the control group. Only group III exhibited this positive transfer.

Analysis of the experimental design showed that the variation in maze B performance as a function of maze A training could not be due to transfer of the specific turning responses acquired on maze A, but was due solely to the stimulus conditions under which maze A training had occurred.

The facilitation of maze A learning by the presence of stimulus conditions providing extra-maze cues did not result in positive transfer to the learning of maze B. On the other hand, while maze A learning was rendered more difficult by limiting the available cues to proprioceptive ones, this training facilitated the subsequent learning of maze B.

It was concluded (1) that the transfer of training effects resulting from place learning and response learning conditions do not parallel the effects which these stimulus conditions may have during original learning; and (2) that the nature of the response acquired under response learning conditions where extra-maze cues are minimized may be more complex than has generally been assumed.

148 pages. \$2.00. Mic 57-2926

PROBABILITY RELATIONS WITHIN RESPONSE SEQUENCES UNDER RATIO REINFORCEMENT

(Publication No. 22,057)

Francis Mechner, Ph.D.
Columbia University, 1957

A procedure was developed for the purpose of investigating the internal cohesion of response sequences maintained on fixed ratio reinforcement. Under this procedure, rats were trained in a two-bar Skinner box on a schedule wherein water reinforcement was delivered either upon the completion of N consecutive responses on the right hand bar, or else upon the completion of a minimum of N consecutive responses on the right hand bar followed by an additional response on the left hand bar. A random programmer determined which of these two conditions prevailed on any run.

Procedure

The two main parameters investigated were N (the minimum number of responses required for reinforcement), and P (the probability that the animal is reinforced immediately upon the completion of the N responses). The values of N used were 4, 8, 12, and 16, and the values of P were .00, .25, .50, and .75. First order sequential dependencies of the lengths of consecutive runs were examined for the condition where $P = .00$, by collecting

separate frequency distributions of lengths of runs for each of several lengths of the run preceding the one recorded. Run-by-run data on lengths of successive runs were also collected for the $P = .00$ condition, during alternating reinforcement and extinction periods.

Results

The following two functions were calculated for the data of each animal for each of the four values of the variable to which he was exposed: (a) The probability of making the left-bar response at each point in the run, given that this point had been reached, and (b) the frequency distributions of lengths of runs. The effect of increasing N was a shift in both of these functions upward along the abscissa, in such a way that the sharpest rise in function (a) and the median of distribution (b) always fell slightly above the stipulated value of N . The effect of increasing P was qualitatively similar to the effect of N . The sequential dependencies of the lengths of consecutive runs were expressed in terms of the informational measure. Visual inspection of the run-by-run data revealed occasional marked cyclic fluctuations in the lengths of successive runs, an effect which may lie at the root of these sequential dependencies. In extinction, marked increases in the variability of the lengths of runs was found.

The methodological implications of these findings for the investigation of the fine-grain structure of regular reinforcement performance, ratio performance in general, and also behavior maintained on interval schedules are discussed.

88 pages. \$2.00. Mic 57-2927

THE EXPERIMENTAL TEST OF A GENERAL THEORY OF ADDICTION

(Publication No. 21,890)

John Richard Nichols, Ph.D.
The University of Oklahoma, 1957

Major Professor: Carl R. Oldroyd

Although many ingenious theories have been evolved to account for addiction to opiates, alcohol, and other compulsion-producing drugs, none of these theories is generally accepted today.

A review of the facts of addiction has suggested that a parsimonious integration of these facts is possible on the basis of a learning theory. An integrated approach to the problem has been formulated from well-established conditioning principles and the known physiological responses produced to opiates and to alcohol. Part of this theoretical framework was tested on animals.

Experiment I tested the hypothesis that an instrumental act which allowed escape from withdrawal distress would be learned as a conditioned response. Withdrawal distress was produced in 12 rats by an initial series of injections which were then stopped. Six rats could escape their distress by drinking a morphine solution. The other six rats performed no instrumental act of escape but were injected with morphine equal to the amount drunk by the escape group. Despite equal morphine intake, only the escape-trained group showed a significant increase in preference for the morphine solution. Even after the

physiological effects of the drug had become negligible (after 14 days abstinence), the escape group still showed a statistically significant preference for the morphine solution, i.e., they relapsed.

Experiment II, a similar experiment using quinine and alum solutions, demonstrated that association of the distinctive taste of the solution with reduction of thirst drive stimuli could not account for the increase in preference.

Experiments I and II support the hypothesis that withdrawal distress is a motivating state of affairs. Varying the severity of the withdrawal symptoms, then, should vary the motivation of the subjects, which should be reflected in a difference in learning to prefer the morphine solution. The results of Experiment III are not inconsistent with this hypothesis.

The results of these experiments lend some support to the proposed general theory of addiction. Relapse in animals was demonstrated for what is believed to be the first time.

The application of this analysis to a few of the more striking facts of addiction and possible techniques for future experimentation are discussed.

106 pages. \$2.00. Mic 57-2928

THE INFLUENCE OF AREA AND PORTION OF THE RETINA STIMULATED ON THE CRITICAL FLICKER-FUSION THRESHOLD

(Publication No. 21,816)

William Cruden Roehrig, Ph.D.
Columbia University, 1957

The major factors which interact to determine the critical flicker-fusion threshold (CFF) are the frequency (F) of the intermittent light, the luminance (I), and the area (A) and zone of the retina stimulated. When the critical flicker-fusion frequency, F, is plotted against log I, the resultant curve splits into two branches, the "rod branch" and the "cone branch." The "cone branch" of the F-log I contour is linear over its major extent (Ferry-Porter law), becoming rather sharply negatively accelerated near the upper limit, levelling off at a point called Fmax, defined as the maximum flicker-fusion frequency obtainable under a given set of conditions. If one increases the area (A) of the test-patch, the linear portion of the F-log I contour is extended and a higher Fmax may be obtained. When F is plotted against log A, it has been shown that the relationship between these two variables is probably linear (Granit-Harper law).

Previous investigations of CFF usually have employed comparatively small areas of test-patch, primarily because it is technically difficult to illuminate homogeneously large test-patches with intermittent pulses of light of high intensity. It has been generally believed that the F-log A relationship is linear only with test-patches up to 5° va in diameter, becoming negatively accelerated with larger areas up to ca 20° va.

The first experiment (of three) in the present report was designed to investigate the F-I-A relationship with higher luminances and test-patches considerably larger than heretofore used. It was demonstrated that the F-log A relationship remains linear with test-patches up to 50°

va in diameter. Similarly, it was shown that the F-log I relationship also remained linear with the larger test-patches.

An Fmax of 82 cps obtained by Hylkema is the highest figure recently reported, with most investigators obtaining maximum values in the mid-sixties. In the second experiment, values of Fmax as high as 107 cps were obtained when conditions favoring high CFF were maximized to the limits of the available apparatus, that is, with a large test-patch (50° va) and high luminance (2.77 log mL). In view of the fact that both the F-log I and F-log A contours had not yet begun to decelerate, it was concluded that had the apparatus been able to deliver greater illumination and if larger test-patches had been available, still higher F values might have been obtained.

In the third experiment it was demonstrated that not all of the area of a given test-patch is effective as a determinant of CFF. It was shown that the centermost part of a foveally-fixated test-patch could be blocked out (leaving an illuminated annulus) without affecting CFF at any given I. By systematically removing the illumination from increasingly large central portions from four test-patches of 6.9°, 17.4°, 33.3°, and 49.6° va, it was determined how much central illuminated area could be removed (i.e., how narrow the annuli of illumination might be made) without affecting CFF at any given level of I. The amount of non-illuminated area which could be removed varied from about 20 per cent for the smallest test-patch to about 66 per cent for the largest test-patch. It was concluded that with regard to effective area of illumination, CFF is determined not by total area of a given test-patch, but by the most "sensitive" portions of the retina stimulated.

57 pages. \$2.00. Mic 57-2929

LEARNING THROUGH STIMULUS SATIATION: ONE TRIAL A DAY

(Publication No. 21,396)

Ruth Holm Wells, Ph.D.
Michigan State University, 1956

Recently learning theorists have been attempting to determine the effects of the numerous factors which are involved in alternation behavior. The present thesis was concerned with several of these factors. The primary interest was in an attempt to determine whether or not the stimulus satiation developed in a specific situation decreases to zero in less than 24 hours. This was tested. The effects of maze cues during the early trials of the learning period, before the formation of a habit, were compared to the effects of the same cues after a turning-response habit had been acquired. Lastly, a comparison was made of the reversal tendency of satiated subjects with that of food-deprived animals.

The apparatus was a standard T-maze; black cardboard inserts were used to line one alley when differential maze cues were required.

Forty-seven experimentally naive male rats were used in the study. Group 1, ten animals, received the following training; (1) 52 days, one trial a day, 2L:1R ratio, (2) 6 days, 3 trials a day with a fifteen-minute inter-trial interval, 2L:1R ratio, (3) 26 days, free trials, followed by a

three-day delay period, (4) 1 day, free trial, with three subjects satiated and two subjects food-deprived, (5) 3 days, free trials, maze rotated 180°. During the entire experiment, the left alley was black and the right alley was natural wood finish. Group 2, eleven animals, received the following training; (1) 24 days, 2R:1L ratio, left alley - black, and right alley - natural wood finish, (2) 3 days, free trials, (3) 33 days, 2L:1R ratio, (4) 12 days, 2L:1R ratio, left alley - natural wood finish and right alley - black, (5) 12 days, free trials, followed by a three-day delay period, (6) 1 day, free trial, with four animals satiated and three animals food-deprived, (7) 3 days, free trials, maze rotated 180°. Group 3, five animals, received the following training; (1) 19 days, 2L:1R ratio, left and right alleys - black, (2) 14 days, left alley - natural wood finish and right alley - black, (3) 16 days, Forced L, Free-choice sequence, (4) 8 days, maze rotated 180°. Group 4, five animals, received the following training; (1) 19 days, 2R:1L ratio, left and right alleys - black, (2) 14 days, left alley - natural wood finish and right alley - black, (3) 16 days, Forced L, Free-choice, Free-choice sequence, (4) 8 days, maze rotated 180°. All trials for Groups 2, 3, and 4 were on a one-trial-a-day basis. Group 5, seven animals, received the following training; (1) 31 days, 2L:1R ratio, left alley - black and right alley - natural wood finish, (2) 10 days, free trials, one a day,

(3) 3 days, free trials, five a day with twenty-minute, inter-trial intervals. Group 6, nine animals, received the following training; (1) 31 days, 2R:1L ratio, left alley - black and right alley - natural wood finish, (2) 10 days, free trials, one a day, (3) 3 days, free trials, five a day with twenty-minute, inter-trial intervals.

The following results were obtained. The acquisition of a habit did occur with all six groups even though the inter-trial interval was 24 hours. Groups 1, 2, 5 and 6, with which differential intra-maze cues were used, showed a tendency to approach the less frequently experienced stimulus complex. Groups 3 and 4, with which non-discriminable maze cues were used, learned to go to the left alley, presumably on the basis of extra-maze cues. The running response which was learned was extremely resistant both to reversal when the maze stimuli were changed and to extinction when the trials were all free-choice. The tendency for satiated animals to show more reversals than food-deprived animals was discussed. There was an indication that extra-maze cues have some eliciting value after a running habit has been developed as shown by the effects of maze rotation after 88 days of running trials.

The limitations of various theoretical approaches to the problem of alternation phenomena were discussed.

52 pages. \$2.00. Mic 57-2930

RELIGION

ATTITUDES OF THE PRE-EXILIC CANONICAL PROPHETS TOWARD THE CULTUS

(Publication No. 21,736)

Robert Theodore Anderson, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Elmer A. Leslie

The purpose of this dissertation is to determine the attitudes of the pre-exilic, canonical prophets toward their contemporary cultus. The approach in the early chapters is historical, describing the origin and development of Israelite prophecy and the Israelite cultus and the rôle played by each during the eighth and seventh centuries B.C. In the remaining chapters of the dissertation, each of the pre-exilic, canonical prophets is studied against the background of his specific remarks concerning the cultus and his vocational, geographical, political and religious position. This approach is primarily problematic, evaluating the approaches of various scholars, including those of the Scandinavian traditio-historical school.

Any attempt to generalize about the "prophetic mind" must be tempered by a realization that the men called prophets did not form a homogeneous group, but belonged to quite different segments of the Israelite social and economic strata. Further, they do not fit into any simple vocational pattern. The commonly used appellation, "prophet," is not helpful because there were many prophetic rôles, professional and non-professional. The tenor of

their messages excludes the possibility of their belonging to any traditional, professional, prophetic order. Based on the evidence presented in this dissertation, the following conclusions are stated regarding the individual prophets: Amos was not a professional prophet; he was "a shepherd and a dresser of sycamore trees." There is not sufficient evidence to suggest Hosea's vocation, although he may have been a priest. Isaiah's vocation is uncertain, but there is strong evidence that he was a scribe in the royal palace. Micah's vocation is likewise uncertain; the best evidence indicates that he was a peasant artisan or farmer. Jeremiah was a priest until his prophetic call and his priestly vocation may have continued during his prophetic career.

The prophetic attitudes toward the cultus were greatly influenced by their opinion of the activities, institutions and social customs sanctioned by the cultus and often the real issue involved in their criticism of the cultus was economic or political, rather than religious. Sometimes the real issue was religious in the narrow sense of the word. Hosea, for example, criticized the cultus because it focused the adoration and loyalty of the people upon false or low values, the Baals, rather than Yahweh. This apostasy broke the covenant between Yahweh and Israel, releasing Yahweh from his obligations to protect and bring prosperity to the Israelites.

Amos objected to the cultus because it was an official sanction of a way of life that was disintegrating the old Israelite social values, resulting in gross injustice to Amos and his people. He advocated the abolition of the

cultus. Hosea believed that the cultus was not serving its rôle, primarily because of poor leadership which left the people to idolatry, immorality and apostasy. He advocated a purification of the cultus. Isaiah's major criticism of the cultus was its rapid expansion in process of which the legitimate objectives were lost from view. He would sanction a purified cultus. Micah was not keenly interested in the cultus. His first concern was social justice and he considered the cultus only in relationship to this concern. Therefore, there is no plan expressed for the cultus, but there is the tacit implication that the cultus would be tolerable if it did not interfere with social justice. The emphasis of Jeremiah suggests that the people had a sincere desire and need for a cultus, but they are condemned for misunderstanding their obligations in regard to the cultus and the leaders are condemned for aiding in this confusion. Jeremiah would have supported an enlightened public practicing of a well administered cultus.

220 pages. \$2.85. Mic 57-2931

ARNOLD TOYNBEE'S CONCEPT OF MAN

(Publication No. 21,738)

James Lee Christian, Ph.D.
Boston University Graduate School, 1957

Major Professor: Dr. Edwin P. Booth

Purpose.--Toynbee deals with problems of human nature surprisingly often, and it turns out, upon examination, that his philosophy of history has its roots in his concept of man.

The purpose of this dissertation is to abstract Toynbee's concept of man from *A Study of History* and *An Historian's Approach to Religion* in order to see it synoptically, and to discover if it is essentially coherent and empirical.

The dissertation includes a biography of Toynbee (with separate statements regarding his religious faith and purpose in writing *A Study of History*) and a summary of his philosophy of history.

Description of Toynbee's concept of man.--Toynbee accepts the evolutionary emergence of man and believes that, at the same time, man is the creation of a personal Absolute Reality working purposefully in history toward some unknown goal. Human nature has undergone little change since "sub-man" became man.

Toynbee builds upon Jung's idea of a "natural religious function" and the necessity of its expression. Religion arises from the "Subconscious Psyche" and speaks through mythology, poetry, and prophecy. Using Jung's typology, Toynbee studies the relation between religion and human nature, and he concludes that each of the "higher religions" is a reflection of elements within human nature. Each religion is of value, therefore, as an expression of human need and human nature.

The most insidious of sins is the "egocentric illusion" ("Original Sin"), meaning the pride which makes a man think and act as though he were the center of existence. In history this sin has played a tragic role in religion (e.g. the idea of a "Chosen People"), in racism (e.g. "Nordic Man"), in nationalism (e.g. "my country right or wrong"),

and in cultural feeling (e.g. the American boasting of his superiority because of Western technology). Yet man has the capacity to overcome this inherent sin: he can "transcend" himself by identifying his center with other centers of existence, and he can become infused with the viewpoint of Absolute Reality.

Man must learn by suffering, for only when he suffers does he turn his attention away from destructive materialism to spiritual values. All true growth takes place in the inner man; the criterion of growth is whether or not there is an increase in a man's ability to get along with other men and with himself. The insights accumulated through man's age-long suffering enable him to understand better the mystery of life and to live life more harmoniously.

Man in history is caught up within a framework of patterns in which he unknowingly moves, and of which he himself is the source. These patterns arise from the operation of the "Subconscious Psyche," probably from layers of psychic activity representing various sorts of collective experience. Yet man can be free, for every operation of the conscious will is a free and creative act, and every time the conscious will gains control over the subconscious it is a victory for freedom.

Conclusions.--Toynbee's concept of man appears to be coherent. At one point (in connection with the source of religion) it is possible that he overstates the goodness of the subconscious; while at another point (in connection with the source of historical pattern) he may over-emphasize the stultifying effect of the subconscious. However, this apparent contradiction can be harmonized in the light of Jung's psychology.

Toynbee's concept of man appears to be primarily empirical (as the term is commonly used). He attempts at all times to rest his argument upon scientific data, and, despite his profuse Scriptural references, he uses the Bible only to illustrate and not to lend authoritative support.

227 pages. \$2.95. Mic 57-2932

THE LEADERSHIP ROLE OF THE URBAN NEGRO MINISTER

(Publication No. 21,938)

Evans Edgar Crawford, Jr., Ph.D.
Boston University Graduate School, 1957

Major Professor: Dr. Walter G. Muelder

The purpose and procedure. This dissertation has sought to determine some of the characteristics of the leadership role of the Protestant Negro minister in the light of the urbanization of the Negro community. The study uses the characteristics, role conceptions and role expectations of Chicago Negro Baptist ministers and laymen as illustrative content and Ideal-type sociological theory as an interpretative framework.

The hypotheses. The dissertation examines five hypotheses: (1) The ministerial leadership role will in its early stages be more closely related to *Gemeinschaft* characteristics because the urbanization involved takes place in a transplanted folk culture. (2) The role images and role expectations will reflect this urban-folk conflict

and in doing so will lack role clarity. (3) The impact of urbanization upon the social characteristics of the Negro community will create a situation in which the needs for trained leadership become acute. (4) The institutional structure of the Negro church in becoming urbanized will have gained independence but needs a type of organization compatible with institutionalized ecumenical Christianity. (5) An analysis of the Negro churches in Chicago reflects this fourfold sociological condition.

The conclusions: The findings relative to the hypotheses are: (1) The *Gemeinschaft* orientations located in the developing race consciousness among free Negroes in the urban North prior to the Civil War, and the "cultural shock" of the Negro migrants beginning with World War I, have served to establish leadership in the urban ministry as a *crescive* type with a predominance of crisis roles. (2) The characteristics and role conceptions of current urban Negro ministers may be understood in this context. The Chicago Negro Baptist ministers, for example, are *crescive* leaders, reflecting such factors as their Southern background (81 per cent of 135 interviewed are from six Southern states) and low professional educational attainment (72.3 per cent of 130, the exact percentage that Mays and Nicholson discovered of 591 urban Negro ministers in the early 1930's, do not possess any kind of academic degree). Moreover, their role conceptions revolve around the crises of urbanization. Seventy-four of one hundred responses with respect to actions, if resources were unlimited, pertained to "building" and "buying" facilities in which to institute programs to meet community problems such as housing and urban adjustment. (3) Lay expectations are characterized by demands for preaching, "pastoring" and character roles. The youth, especially expected the minister to be rather than to do. On the whole the laymen were able to state their criticisms more clearly than their role expectations. (4) Urban crises center around race consciousness and social disorganization. Around these problems two types of organization and professional leadership have developed: the National Urban League and the National Association for the Advancement of Colored People. The ministerial leadership as a part of community leadership needs to recognize such professional leadership and organized activity as a necessity of *Gesellschaft* social structure. (5) Problems are posed for the urban church and its ministry by the difficulties of concerted action, the threats of urban redevelopment programs and the needs of social welfare. The independent Negro churches, especially those with congregational type polities, need the facilities of ecumenical Christianity adequately to represent Protestantism in the inner city. The Chicago Church Federation has recently voted to establish a Church Extension Fund for the needs of urban churches in their ministry to the inner city without the aid of national organizations. The role conceptions of the leadership of many of these independent churches and the role expectations of the laymen need increasingly to become more compatible with institutionalized ecumenical Christianity.

176 pages. \$2.30. Mic 57-2933

THE LIFE AND MINISTRY OF RALPH WASHINGTON SOCKMAN

(Publication No. 21,940)

Robert Bruce Hibbard, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Edwin P. Booth

The purpose of this dissertation is to describe the life and ministry of Dr. Ralph Washington Sockman. The method of conducting research for this study is through personal discussion with Dr. Sockman, the reading of his published books, the reading of his sermons, and through personal interviews with many of his associates.

For purposes of effective organization the dissertation has been divided into three main parts, namely: (1) "A Biographical Survey" (Chapters II through IV), (2) "The Christ Church Ministry" (Chapters V through VII), and (3) "The Ministry to the World" (Chapters VIII through X).

In Part I the biographical account depicts Dr. Sockman's life from birth to his present day endeavors. A consideration of his ancestral background is followed by a description of his early youth. The educational side of his life is described as he progresses from the instruction encountered in the one room school house to the halls of higher learning as evidenced in his work at Ohio Wesleyan University, Columbia University, and Union Theological Seminary. A section is devoted to a consideration of the reasons for his decision to enter the Christian ministry. The joys and sorrows of his family life are dealt with and this first section concludes with a listing of the many honors bestowed upon him.

Part 2 describes Dr. Sockman's relationship to Christ Church as he assumes the role of pastor, church administrator, and preacher. In describing Dr. Sockman in his pastoral relationships an attempt is made to depict the type of constituency that comprises the membership of Christ Church. This section describes how he understands the needs and problems of the city population. In considering his ability as a church administrator an account is given of his leadership as evidenced through the building of Christ Church both from a physical and a spiritual standpoint. The total organizational framework of the church is considered. In his role as preacher, a considerable amount of illustrative material is given concerning the organization and content of sermons as well as a survey of the titles, themes, and trends of his sermonic material. The entire field of sermonization is described from the gathering of material to the actual delivery of the message.

A consideration of Dr. Sockman's ministry to the church at large is considered in the third and final part of the dissertation. His teaching ministry to the students at Yale Divinity School and of Union Seminary illustrates the outreach of his ministry as it influences ministerial students. As further evidence of his teaching ministry a brief statement describing his published books is given. His contribution to the greater church is shown by a study of his vast radio ministry. A brief history of the National Radio Pulpit is followed by a description of the broadcast. Included in this section is a compilation of letters received by Dr. Sockman from the many radio listeners. This radio correspondence tends to reveal the various types and classes of people who are weekly listeners to

National Radio Pulpit. The final chapter deals with Dr. Sockman's activity in the great ecumenical movement of Christendom. Consideration is given to his work with the General Conference of the Methodist Church, The Methodist Peace Commission, The World Methodist Conference, The Federal Council of Churches, and the World Council of Churches.

This dissertation stands as a sympathetic descriptive study of a ministry which is regarded by millions of people throughout the world as an achievement of great and beneficial influence within the framework of modern Christian Society. 182 pages. \$2.40. Mic 57-2934

A STUDY OF THE PROBLEM OF CRITERION OR THEOLOGICAL AUTHORITY IN SELECTED CONTEMPORARY THEOLOGIANS

(Publication No. 22,015)

Robert Clyde Johnson, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Nels F. S. Ferré

The problem treated is that of the selective criterion used in the formulation, organization, and judgment of protestant theology. The question is oriented historically by brief studies of the pre-critical answers advanced by Luther and Calvin, and the representative nineteenth century re-formulations of Schleiermacher, Martineau, the Jesus of history movement, Sabatier, Kierkegaard, and Forsyth. The contemporary theologians surveyed in detail are Farmer, Tillich, Barth, Brunner, Nygren, Aulén, and Ferré. A concluding summary suggests the direction in which the study has indicated that present and future protestant theology could most profitably move as it confronts this problem.

Two strands are identified in Luther: a passionate insistence that the *sensus literalis* of the biblical documents must be used as the theological criterion; and an uninhibited, selective freedom in the use of biblical materials. It is contended that these should be left as they are found, unsystematically juxtaposed, in Luther's writings. Calvin's systematic doctrine of "Word and Spirit" is examined in the light of twentieth century assumptions; and the unresolved dilemmas and unanswered questions which the Reformers bequeathed are indicated.

The discussion of Schleiermacher is utilized to demonstrate the nineteenth century shift in the definition of the problem, from the ground of the biblical materials to the domain of "piety," "mystical immediacy," or some form of "religious experience." Martineau re-formulated the "courts of ultimate appeal" as "reason" and "conscience"; the historical Jesus movement sought a new criterion in the "moral communion" which Jesus exemplified; and Sabatier championed "Christian consciousness" as the protestant authority. Strong protests against the threat of relativism are found in Forsyth, and a redefinition of "subjectivity" in Kierkegaard; and it is shown how each anticipated the most decisive movements, and framed the most critical problems, of contemporary theology within this area.

The influence of Schleiermacher, Oman, and Buber upon

the new *discrimen* advanced by Farmer is traced; and the facets of his personalistic doctrine are examined. The conclusion reached is that no decisive break with nineteenth century theology is here discernible, and no conclusive evidence of a recovery of Reformation presuppositions. A similar situation is discovered in Tillich, whose insistence upon a plurality of "analogous norms" forces an identification of the determinative element of theological authority in the experiential or existential.

A decisive break with the nineteenth century is found in Barth and Brunner, who force once more, beyond the acceptance of historical-critical methods, the issue of the authority of the Bible. The examination of their criteria unfolds unanswered questions in their views of biblical authority, and in their utilization of the element of historicity.

The presuppositions underlying the "scientific theology" of the Lundensian theologians enshrine the most unique contemporary attempt to answer the question. The Kantian basis of their contentions is indicated; and the non-normative methodology which they have advanced is illustrated with the theology of Aulén. A critical evaluation asks if the products of *motivforskning* may accurately be described as "theology," or whether the acknowledgement of a norm is not inescapably inherent within Christian theology. The writings of Ferré furnish the example of a system acknowledging singular normativeness. His methodological submission of all doctrine to the full authority of *agape* is related to his appreciative but critical use of Swedish research; and an attempt is made to identify his functional criterion, and to describe his view of the authority of the Scriptures.

The conclusion sketches the current situation of the problem, illustrating: the new footing of the biblical materials; the uneasiness of present-day theologians with the historicity at the core of Christian theology; and the uncertainty about the status of theological formulations and the relationship of biblical to other types of theology. The rudiments of a doctrine of theological authority are indicated, through the suggestion of a configurational criterion which relates Christianity's historical factuality, its biblical record, and the action of the Holy Spirit whom it confesses. 382 pages. \$4.90. Mic 57-2935

THE PLACE OF GOD IN THE EDUCATIVE PROCESS ACCORDING TO GEORGE A. COE, WILLIAM C. BOWER, AND HARRISON S. ELLIOTT

(Publication No. 21,874)

Major J. Jones, Th.D.
Boston University School of Theology, 1957

Major Professor: Walter L. Holcomb

The problem of the dissertation is to discover and to evaluate the views held by George A. Coe, William C. Bower, and Harrison S. Elliott concerning the place of God in the educative process. Focus is upon their educational concepts with respect to the immanence of God, and how these concepts relate to the place of God in the educative process.

The method is to analyze the basic writings of Coe,

Bower, and Elliott, to correlate agreements and disagreements, and to present a critique of their basic educational positions concerning the central theme.

Coe, Bower, and Elliott do not differ greatly in their basic educational philosophies. Their religious educational principles were largely influenced by the pragmatic philosophy of progressive education. Liberal religious education differs from progressive education in its frame of reference and its aims and objectives. It is experience-centered. Religious maturity is the by-product of the meeting of persons. Man is a biological and a spiritual being. He is a part of the evolutionary process of becoming.

Coe's primary aim was to criticize traditional religious education, with its stress on other-worldly concepts, and to offer a social theory of religious education. Bower's major concern was to establish educational foundations for an experience-centered curriculum of religious education. Elliott's primary purpose was to formulate theological foundations for liberal religious education, and to defend it against neo-orthodox theologians and religious educators. The three men further diverge in their emphasis upon the concept of God-as-immanent-in-the-educative-process. Moving from the thought of Coe to Bower and then to Elliott one sees increasing stress upon God as both immanent in and yet transcendent to the educative process.

In their development of the concept of God-as-immanent-in-the-educative-process, Coe, Bower, and Elliott do not reveal fully where the extra-human transcends human initiative, and how God can be understood by pupils within the process. Knowledge of God is derived out of social and religious experiences, but only the social side of experience is fully developed. God transcends the educative process, but how is not made clear. It is not fully clear what God is as an entity beyond the educative process.

Social values and ends are stressed without full development of spiritual values and ends. There is concentration on growth and what man can do for himself, without adequate consideration being given to what a redemptive God does for man. There is a tendency to project the human into the divine, a danger which is always present when the search for God is begun with man and not with God. Elliott recognizes these weaknesses in the liberal position, and attempts to correct them. In his thoughts more than in those of the others one sees more of a concept of God-in-the-educative-process as a creative, dynamic, and redemptive reality.

Coe, Bower, and Elliott gave strength to the liberal position by taking a realistic view of human nature and its possibilities; interpreting the potentials of human personality according to the insights of science; asserting a more coherent view of man, nature, and God; espousing a belief in the spiritual significance of social values; holding that individuals become persons through the dynamic process of the interaction of divine-human conditions in an environing reality; regarding experiencing as an engagement of the whole organism; making use of the scientific method in describing pre-conditions of personality development; taking a broader view of revelation; and asserting that scientific knowledge is both relevant and important in the search for a fuller knowledge of God.

436 pages. \$5.55. Mic 57-2936

THE IDEA OF CREATION IN THE OLD TESTAMENT

(Publication No. 21,941)

Ethan Theodore Mengers, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Elmer A. Leslie

The purpose of this study is to describe the OT creation concept, assess its importance, and investigate the problem of creation *ex nihilo*. The approach of biblical theology is made, postulating some degree of unity and validity in major OT ideas. Every passage in the OT bearing on creation is noted.

The word *bara* is used 48 times, always of action by God only, but the word does not require the *ex nihilo* idea. Twelve other verbal roots express creation.

The OT has the usual cosmology of the ancient Near East. The earth is flat and stationary. There is a cosmic ocean around the dry land, and also below it and above the firmament. This deep is often viewed as potentially destructive, but controlled by God's power. Many reminiscences of early creation myths remain in the OT.

There are more than 150 passages in the OT dealing with creation. The doctrine that Yahweh created the world was present and important from early times in Israel, as shown by the mythological allusions, the enthronement psalms, and early passages. The idea was given extraordinary stress in Job (c. 600 B. C.) and in Deutero-Isaiah, and after the exile it was always an important doctrine, as seen in the P account, many psalms, and Proverbs 8.

God's transcendence and difference from nature is constantly stressed. The eternal God created the world out of His free choice, and is in complete control over it.

Although God is different from the world He is not remote from it. This shows itself in two important ideas. God's continuing participation in nature, or "continuous creation," shows this. All natural events and the ongoing life of man and beast depends upon God's continual creative activity. Again, God is the Lord of history, a thought often stressed in the creation passages (e.g., Deutero-Isaiah). The power by which He created the world is the same power He exercises in the control of history, directed toward redemption.

The OT creation idea contains the thought that the world is essentially good, apart from human sin. There is stress on the ethical purpose of the creation. The concept of the great dignity of man, made in God's image, and given dominion in the world, is an important contribution. Often there is expressed great joy in creation and nature.

There are a number of passages in Job and early psalms that hint at the *ex nihilo* idea. In Deutero-Isaiah this idea is stressed in connection with the very strong statements of monotheism, and that Yahweh, alone, is the first, and that He made all things. The same idea is expressed in Proverbs 8:22-31.

An exegetical study of Gen. 1:1-3 shows that the interpretation that verse 1 is a subordinate clause is possible. This points to the idea of the pre-existence of the deep, and denies creation *ex nihilo*. It is shown, however, that a stronger case can be made for verse 1 as an independent sentence, on exegetical grounds.

Evidence from the diction indicates that Gen. I (P) was written by authors aware of Deutero-Isaiah and his *ex*

nihilo doctrine. When Genesis 1:1-3 is studied in its relation to earlier passages, and to Proverbs 8, it tends to show that it, too, was intended to portray the creation ex nihilo idea. 402 pages. \$5.15. Mic 57-2937

THE EDUCATIONAL PHILOSOPHY OF THE NEW BEACON SERIES IN RELIGIOUS EDUCATION

(Publication No. 21,875)

Robert L'Hommedieu Miller, Th.D.
Boston University School of Theology, 1957

Major Professor: Walter L. Holcomb

A. The Problem

The problem of this dissertation is to describe the educational philosophy of the New Beacon Series in Religious Education, to evaluate its philosophy in the light of three major contemporary educational philosophies, and to suggest where future developments in the Beacon Series might come. This study is significant because the department of education of the recently formed Council of Liberal Churches (Universalist-Unitarian), Incorporated, in developing the Beacon Series, faces the task of rethinking its philosophy of education, improving its total program, and determining how the program can be more effective in the future.

B. Procedure

The procedure employed in this study is first to survey Perennialism, Essentialism, and Progressivism, establishing criteria for evaluating the educational philosophy of the Beacon Series. Three aspects of educational philosophy are used: educational aims, educational methodology, and the meaning of "curriculum."

Secondly, an analysis of the position of the Beacon Series with respect to each of the aspects of educational philosophy is made.

Finally an evaluation of the educational philosophy of the Beacon Series is made in the light of the criteria established. The evaluation contains suggestions as to deficiencies in the Beacon philosophy and steps to be taken to improve the Beacon Series.

C. Conclusions

The following are the conclusions of this study of the Beacon Series:

1. The Beacon Series purports to be a progressive program of religious education. 2. The Beacon Series lacks a unified or consistent philosophy of religious education. 3. In aims and methods progressivism prevails in the program for younger children and essentialism in that for older children, the junior age bracket being the point of transition. 4. The meaning of curriculum is more in accord with an essentialist philosophy throughout the series, more strongly represented in materials from the junior age through high school. A child-centered emphasis, reflecting an early and since modified progressivism, is present in the program for younger children. 5. The major limitations of the Beacon Series in the light of a progressive educational philosophy were found to be the following: a. A very limited expression of an adequate

philosophy of experience; b. A subtle indoctrination through the control of religious education so as to insure that the students will arrive at liberal religious conclusions; c. A limited concept of the democratic classroom, the element of authoritarian control in selection of course material being rather basic; d. A limited emphasis on the role of education in social reconstruction; e. A radical transition in aims and methods at the junior age level from more progressive to more essentialist patterns, the outcome being a curriculum more heavily essentialist throughout. 6. The following suggestions were made to meet these limitations and provide direction in the production of a more consistent program of progressive religious education: a. A clarification of the philosophy of experience in accordance with progressivism; b. A concentration on the instrumental role of the religious heritage in understanding experience; c. Revision of the Beacon Series materials to bring them into conformity with the more progressive point of view embodied in the supplementary literature associated with the Beacon Series, with special attention being given to changing the teacher's guides into manuals for the conduct of the class on the basis of an experience-centered methodology; d. Elimination of the transition at the junior age level and development of a progressive pattern throughout the curriculum; e. Addition of materials portraying varying religious points of view in a more sympathetic light, enabling the student to examine more than one alternative as he seeks to arrive at his own conclusions; f. Addition of materials designed to build self-understanding for all age groups, offering resources for study and research in this important aspect of growth and development throughout the church school experience. 426 pages. \$5.45. Mic 57-2938

THE THEOLOGY OF PHILLIPS BROOKS

(Publication No. 21,742)

Alfred Benson Minyard, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Edwin P. Booth

The purpose of this dissertation is to expound the theology of Phillips Brooks as it is set forth in his writings, published and unpublished, for the contribution which his thought may make, not to the field of technical theology, but to the use of doctrine in the nurture of souls. The problem in such a study is that of drawing from his non-technical language, more illustrative than definitive, the specific meanings which differentiate one school of theology from another.

Part I is a survey of Brooks's theology as a whole. He chose, as the expression of his peculiar genius, to devote himself to the translation of doctrine in terms of life. Identified with the broad, evangelical elements in the Episcopal Church, he held generally to the words of creedal orthodoxy while giving them such a breadth of interpretation as to bring him to a position in harmony with the "New Theology" of the last half of the nineteenth century. Running through all his writings are certain conceptual principles which stand as presuppositions and ruling factors in his thought: the immediateness of the

divine influence, the sanctity of the common life, the naturalness of the ideal, the dignity and worth of the human soul, and the supremacy of the spiritual over the formal. On the basis of these principles, Brooks reduced the essentials of Christian doctrine to these four ideas: (1) the Fatherhood of God and the brotherhood of man; (2) the redemption of man by Christ; (3) the perfectibility of the soul; and (4) the immortality of human life.

Part II deals with the Christology of Brooks, with the Incarnation being seen as the core of his theology, from which he derived his doctrine of the immanence of God and the essential divinity of man. While affirming his faith in the Athanasian Creed, Brooks held it, not as a final formulation, but as a historical boundary between orthodoxy and heresy. Within the general area it encompassed, he moved with apparent freedom, often expressing himself in terms suggestive of less orthodox Christologies.

Part III deals with Brooks's position on other doctrines. While stressing the immanence of God, he saved himself from pantheism by his belief in the distinct personality of God. Seeking to avoid tritheism on the one hand and Sabellianism on the other, Brooks yet declared his views on the Trinity in terms suggestive of both, being sufficiently vague as to leave a possibility of applying modern concepts to his thought. He took seriously Jesus' teaching that every man is a child of God, created as such and remaining such through all sin and rebellion. He saw the Bible as the record of the revelation of God in human experience. He believed that every man belongs by nature to the church, which, in its idea, is simply the ideal world. He saw the kingdom of God as the attainment of a right relationship of humanity with God, and expected its coming because all eternity is the field in which the will of God may be done.

In the Conclusion it is noted that Brooks, while no technical theologian, had profound insights into the most complex theological problems. Almost every sermon proved to be doctrinal in that it dealt with those great realities of the divine-human experience which compose the material from which theology is formed. Through his published works and his popularity as a pulpiteer, Brooks wielded a tremendous influence on the religious life of America and England, teaching the conservative to broaden the scope of his thought, and the liberal to recover spiritual values in discarded doctrines. By the breadth of his thought and the universality of his spirit, he did more than any other person to lift the Episcopal Church to a new vision of itself and to a wider public acceptance.

213 pages. \$2.80. Mic 57-2939

RELIGIOUS INTERESTS OF COLLEGE STUDENTS AT THE UNIVERSITY OF OKLAHOMA

(Publication No. 21,889)

Johanna K. Mott, Ed.D.
The University of Oklahoma, 1957

Major Professor: Frank A. Balyeat

The problem in this study was to discover the interest in religion as expressed by University of Oklahoma undergraduate students by investigating the following questions:

What is the students' expressed need for religion? What is the expressed interest of the students in religion? What is the students' interest in selected religious topics? What are the influences which affect the students' religious interests?

The survey method and questionnaire technique was used to secure the data. The 1763 responses to the questionnaire represent a twenty percent random sample of the total undergraduate enrollment for the first semester, 1955-56.

Analysis of the data leads to the conclusion that the students in this sample are not indifferent to religion. Eighty-nine percent of them say that they need a religious orientation in order to achieve a fully mature philosophy of life. Fifty-seven percent of them characterize present interest in religion as "strong interest."

The topics in descending order in which the largest percentage of the students express interest are: Religion and Marriage, The Nature of God, Man's Relationship to God, The Meaning of Faith, and The Place of Religion in Modern Life.

The most helpful factors influencing student interest in religion are: (1) personal factors, such as Own Conscious Need for Religion, Previous Religious Training, and Personal Increased Desire for Religious Knowledge, (2) Worship Services and Programs sponsored by the various religious groups. College experiences seem to be most influential in encouraging student interest in the problems that religion seeks to answer. The discouraging influences selected by the students in this sample were Pressure of Time and Priority of Need to Study.

A summary of the comments and recommendations based on the historical review of the place of religion in higher education, the survey of provisions for religion at the University of Oklahoma, and the analysis of the data is as follows:

1. Official statements from the University of Oklahoma reflect a concern for the religious, moral, and spiritual training of students.
2. It is recommended that the Christian Associations re-examine their role on the campus.
3. It is recommended that the University explore the need for coordinating religious activities and provide for religious counseling.
4. Findings from this study should be made available to those responsible for planning the Conference on Religion, faculty members and personnel staff who are interested in total personality development of students, and leaders of the off-campus religious groups.
5. The enrollments in the courses in the Philosophy of Religion and Ethics indicate that these courses are relevant to the needs and religious interests of the students.
6. Further investigation of the place of religion in higher education as well as the religious interests of students should be encouraged.

131 pages. \$2.00. Mic 57-2940

THE DEVELOPMENT OF THE CONCEPT OF THE RESPONSIBLE SOCIETY: STOCKHOLM TO EVANSTON

(Publication No. 21,744)

Richard Duey Nesmith, Ph.D.
Boston University Graduate School, 1957

Major Professor: Dean Walter G. Muelder

The central problem of this study is to trace the development of the idea of the responsible society in the discussions within the Ecumenical Movement and to analyze its nature, content, and usefulness.

The idea of the responsible society as formally conceptualized in the "Report of Section III" of the Amsterdam Assembly incorporates the polarity of the social order between freedom and equality under the normative ideal of responsibility.

A responsible society is one where freedom is the freedom of men who acknowledge responsibility to justice and public order, and those who hold political authority or economic power are responsible for its exercise to God and the people whose welfare is affected by it.¹

The study is limited to an intrinsic survey of the relevant sections of the preparatory studies and reports of the Stockholm and Oxford Conferences and the first two Assemblies of the World Council of Churches since these events represent points of culmination in each respective period.

The question of the nature of the relationship between the reality and the demands of the Kingdom and the concrete issues of the social and political orders constitutes one of the central problems of the Christian faith and particularly of the Ecumenical Movement in this period. The Stockholm Conference was divided on this question between those who emphasized the value of man's attempts to approximate the ideals of the Kingdom, and a vocal minority who were convinced of the futility of man's efforts. Both of these dimensions were recognized in the attempt of the Oxford Conference to formulate "middle axioms" as guideposts for the Christian life. The Amsterdam Assembly formally developed the concept of the responsible society. Both Amsterdam and Evanston Assemblies evidence an increasing use of the concept of the responsible society as a dynamic norm for society and a deeper understanding of the relation of the Kingdom to the world.

The structure of the concept of the responsible society is characterized by a polarity between freedom and equality in the social order as the horizontal plane, and a second polarity in the vertical plane between the ideal values which give meaning to the idea of responsibility and the nature of the actual practice.

The final portion of the study dealt with the function and usefulness of the concept. This was summarized under four categories. First, the idea of the responsible society provided an over-arching ideal which then functioned as a goal for the social order and a point of focus for discussions among the churches. Secondly, the concept acted as a point of reference between the absolute ethical presuppositions of the Christian faith and the concrete situation. This point of reference served as a central expression of these ultimate ideals through the norm of responsibility and also as a core from which more specific subsidiary

norms could be developed. Third, the structure of the idea of the responsible society served as a conceptual tool for the analysis and reassessment of the concrete situation. Finally, the concept provided a criterion for social analysis and evaluation.

The concept and its use naturally possess certain limitations. The tendency to identify the concept too closely with either extreme in the vertical polarity between the Kingdom or the world is the foremost limitation. A second continuing tension is centered in the problem of solidification, for on the one hand the concept seeks to have its meanings embodied in the structures of the social order while on the other the idea itself must remain free in order to meet new problems.

284 pages. \$3.65. Mic 57-2941

1. "Report of Section III," Man's Disorder and God's Design, World Council of Churches (New York: Harper and Brothers, 1954), III, 192.

MAJOR THEOLOGICAL BELIEFS OF THE CHURCHES OF CHRIST AND THEIR IMPLICATIONS FOR CHRISTIAN EDUCATION

(Publication No. 21,943)

Joseph Enloe Sanders, Ph.D.
Boston University Graduate School, 1957

Major Professor: Donald M. Maynard

Purpose of the Dissertation

The purpose of this dissertation is to set forth in an objective and critical manner some of the major theological concepts of the Churches of Christ in America and to show what the implications of these are both for a philosophy of Christian education and for a program of Christian education.

Procedure

A high lighting of relevant eighteenth century church history is first given, since it forms the background of the Restoration Movement out of which the Churches of Christ developed. Major works of Barton W. Stone, Thomas Campbell, Alexander Campbell, and Walter Scott are used. Later works of Churches of Christ leaders are cited to show that these beliefs remain basically unchanged.

Beliefs concerning the nature of God, Christ, man, reality, revelation and human knowledge, and the church are discussed. An outline of a philosophy of Christian education consistent with these beliefs is developed and the implications of such a philosophy for Christian education are given.

Results of the Investigation

The following concepts are prominent in Churches of Christ theology. (1) The Scriptures are a revelation from God to man. (2) The Scriptures constitute the primary source for knowing God. (3) God is both immanent and transcendent. (4) Jesus Christ is the unique point of entry of divinity into the stream of humanity. (5) The virgin birth, vicarious suffering, and substitutionary atonement are cardinal beliefs. (6) Man is a finite creature subject

to the limitations of his particular environment, and at the same time capable of reaching after that which transcends his finiteness. (7) Man is preeminent among the works of creation. (8) Man has freedom to make choices. (9) The gap between God and man is bridged by God descending to meet the limitations of human nature, not by man himself overcoming them. (10) Reality consists of many levels. Each level finds its own fulfillment when it is possessed by a higher level, and each higher level uses levels below itself for its own fulfillment. (11) There are two levels of truth, revealed and natural. (12) The content of Christianity is not a rational deduction from premises. (13) The church is a divine-human institution. Membership in the church is essential to salvation. (14) Conversion is both an event and a process.

Specific Conclusions Based Upon the Theology of the Churches of Christ

1. The Scriptures occupy a central place in the curriculum.
2. Both God and the individual must be at the heart of Christian education.
3. The needs of the individual and the basic demands of the Christian faith are criteria for curriculum construction.
4. Based upon a metaphysics which assumes a stable universe and an absolute truth, objectives of Christian education should have a stable and fixed quality.
5. The meaning and content of Christian education should be based upon super-naturalistic pre-suppositions, while the method of Christian education should be based upon naturalistic pre-suppositions.

General Conclusions Based Upon the Implications of the Theology of the Churches of Christ

1. There should be greater co-operation between the church and the home.
2. A larger use of the findings of modern psychology in the field of child study and the nature and conditions of learning must be made.
3. The curriculum of Christian education includes, not only formal, printed lessons based principally upon the Bible, but all the planned activities and experiences by which persons become Christ-like. The criteria by which activities are selected are both Christian and developmental.
4. Since learning the proper content does not necessarily lead to Christian behavior, it is necessary that opportunities be provided whereby these truths can become related to life.
5. Further study is needed to resolve the dilemma between man's freedom and God's authority, and the role of the teacher in this relation.

178 pages. \$2.35. Mic 57-2942

JESUS AMIDST THE TENSIONS OF PALESTINIAN JUDAISM AS VIEWED IN THE SYNOPTIC GOSPEL RECORDS

(Publication No. 21,944)

George Alexander Sewell, Ph.D.
Boston University Graduate School, 1957

Major Professor: Professor Edwin P. Booth

1. A Statement of the Problem with Limitations. The primary problem of this dissertation is to determine the Synoptic Gospel view of the manner in which Jesus met the various conflict-situations present in the social intercourse of the Palestinian community of the first century A.D.

Essentially, the concern here is with the behavior of Jesus as seen in interpersonal relations. This study proposes to observe Jesus' demeanor as he is caught up in the various struggles of his time. The goal in mind is not to analyze Jesus' historical acts as such, but to portray the ways in which the Synoptic Gospel writers viewed them.

This study is limited geographically and politically to Palestine, religio-culturally to Judaism. Its primary data are confined to the Synoptic Gospel records.

2. The Research Plan. Chapter Two surveys the social milieu of the first century, which is seen to be fraught with a diversity of human struggles. Chapter Three examines the records of the Synoptic Gospels for incidents of conflict and/or tension. The conflict-situations tend to divide themselves into the following general classes or groups: primary, secondary, intra-group, personal, and miscellaneous. The seventeen primary conflict/tension situations are the elementary data upon which this investigation is contingent.

Those situations are: Healing of the Paralytic, The Call of Levi, Violating the Fast, Violating the Sabbath (2), Casting out Demons, John's Question to Jesus, The Rejection at Nazareth, Transgressing the Tradition, A Sign from Heaven Sought, Of Marriage and Divorce, Cleansing the Temple, Of Authority, Tribute to Caesar, Of the Resurrection, Of the Great Commandment, and Concerning David's Son.

Chapter Four analyzes the seventeen primary conflict situations. One method is via a Schema composed of ten column-heads: Situation, Texts, Charge (or Question), By Whom, Conflict-Type, Locale, Jesus' Assumption of Messiahship, His use of Old Testament Scripture, Opponents' use of Interrogation, Jesus' use of Counter Question. The other is via Discourse. This is done under three sub-heads: Prolegomenon, Background Factors; The Charge, in the particular situation, and Jesus' Reaction.

3. Conclusion (Part 1). The seventeen primary conflict-situations may be grouped under the following general classifications: Healings and Exorcisms, The Tradition, Legal Matters, Theological Matters, Messianic Implications, Nationalism, and Jesus as Offender.

Ten of the situations take place in Galilee. Members of the Pharisaic group are seen as the chief adversaries. Transgressing the Tradition is responsible for most of the charges. In Galilee Jesus assumes, or otherwise indicates, his messianic consciousness on six separate occasions. He is not seen doing such even once while in

Judea. Of the seven instances in which Jesus quotes Scripture in Galilee, three are from the Prophets, two from the Writings, and one from the Torah. In Judea he refers to the Scriptures five times--once from the Prophets, and four times from the Torah.

Conclusions (Part 2). This investigation reveals that Jesus does not follow any definite behavior-pattern while involved in the tension-situations present in the social intercourse of the first century Palestinian community. It also reveals certain fundamental characteristics of Jesus' behavior-in-controversy. Religion is not an empty ceremonialism, nor observance of a set of rules, but a total attitude generated by love for God and for one's neighbor. Loyalty to God is man's supreme responsibility. All persons irrespective of race, color, or class are children of a common Father-God, and as such share his concern.

Jesus brings a fresh, unique spontaneity to each new situation. Jesus is seen as a revolutionist of the spiritual type. He sometimes provokes conflict-situations. Although he does not court conflict, he does not avoid it by abandoning his basic principles. He is openly opposed to the social and religious *status quo*. At no time is he seen compromising his position. He is opposed to the Scriptural literalism of the Sadducees and the "Tradition-Minuta" of the Pharisees. 299 pages. \$3.85. Mic 57-2943

LOWLINESS, A SOCIOLOGICAL, ECONOMIC AND THEOLOGICAL CONCEPTION OF THE NEW TESTAMENT

(Publication No. 22,027)

James Roy Valencourt, Ph.D.
Vanderbilt University, 1957

Supervisor: Professor Kendrick Grobel

The basic purpose of this study is to attain an understanding of "lowliness," a conception of the N.T. The writer comprehends by "lowliness" such meanings as meekness, humility, humiliation, the poor, poverty, the oppressed ones, and the lowly. Thus lowliness includes religious, psychological, sociological and economic aspects.

Understanding lowliness as found in the N.T. requires a knowledge of the background of the N.T., and particularly of that part of the background where an antecedent stage of lowliness is found. Consequently an introductory chapter is devoted to depicting that background. The social and economic structure of the Egyptians, the Greeks, the Babylonians and the Hebrews of antiquity was studied. Economic poverty was found to be prevalent. Lowliness at that time consisted essentially of poverty with its many sociological implications. But along with poverty was

found also a certain uneasiness about such conditions as then obtained.

As the study moved into the O.T., this uneasiness became more and more pronounced. It culminated in loud and harsh condemnation by the prophets of those who abused the poor.

It was at this point that something radically new began to happen. We get an inkling in Am. 2:6 of the idea that the poor are pious. This idea spread and eventually became an assumption with some late Jewish writers. Probably it began as an isolated observation that many poor are pious. But eventually the poor as a group came to be considered pious and the rich as a group to be considered wicked. This then is a *précis* of the introductory chapter.

The second chapter presents the philological background for lowliness. Six Greek words which best characterize lowliness as found in the N.T. were chosen (*praüs, ptochos, tapeinos, penes, epieikes, and chrestos*). The classical meanings of these words were surveyed and found to contain very little of specifically religious denotation. A sketch of the use of these words in the LXX followed. Here we found many indications of developing religious meanings. The second chapter and the background for lowliness in the N.T. were concluded by a brief preview of the use of these six words in the N.T.

The third chapter opens the discussion of lowliness as present in Luke-Acts and James with a summary of the basic economic and sociological orientation of these two writings. They both express strong sympathy for poor, lowly and despised folk. The rest of the chapter presents exegeses of the verses in which any one of the six Greek words or their cognates appears. This exegetical analysis produces a mass of evidence that all these words have in the N.T. acquired a great degree of religious significance. Many occurrences, however, especially in Luke, remain either primarily economic in meaning or else ambiguous.

The fourth chapter begins with a survey of the orientation of Matthew, Paul, the pastorals, Peter and Revelation. In this chapter the occurrences of the Greek words in the remaining books of the N.T. were discussed. Here we found that Matthew made himself quite clear at numerous points where Luke in parallel passages either left the occurrence ambiguous in meaning, or else implied economic interpretations of such verses. The vast majority of all the verses treated in the fourth chapter were interpreted as possessing religious coloring or full religious significance.

The fifth chapter is the point at which the entire study is summarized. There the conclusion is stated that lowliness began as economic poverty, slowly became religiously colored under the influence of a developing social conscience and in the N.T. came to be a concept of fullest religious and theological significance.

223 pages. \$2.90. Mic 57-2944

SOCIAL PSYCHOLOGY

ATTITUDES TOWARD FIRST NAMES: AN INVESTIGATION OF THE RELATION BETWEEN SELF-ACCEPTANCE, SELF-IDENTITY AND GROUP AND INDIVIDUAL ATTITUDES TOWARD FIRST NAMES

(Publication No. 21,598)

Daniel Adelson, Ph.D.
Columbia University, 1957

Chairman: Goodwin Watson

Background of Study

On the basis of three pilot studies and previous research in the field, which may be described as having used three main approaches in the investigation of attitudes toward first names: a) the name as an object of group-wide like or dislike; b) the name as an object of concern for the individual bearer of the name, and c) the name as self or identity -- a series of interrelated hypotheses with respect to the first name were proposed. These were based on the rationale that the name may often form a major part of the self-organization of the individual.

The questions with which the hypotheses concern themselves were stated as follows:

1. Is there a relation between group-wide attitudes (like or dislike) for first name and the individual's own attitudes toward his name?
2. Is there a relation between group-wide attitudes (like or dislike for) the first name and the individual's identification with his name?
3. Is there a relation between individual dislike for own first name and the level of self-acceptance?
4. Is there a relation between individual attitudes toward (like or dislike for) own first name and the individual's identification with the first name?

Instruments and Procedure

To test the hypotheses three instruments: a) a self-acceptance scale, b) a questionnaire on attitudes toward own name, and c) a list of the first names of the subjects for rating on liking, were administered to 181 college and 207 high school students.

The Findings

The findings for both groups show:

1. Individuals tend to like their own first names.
2. Those whose first names are liked by the group like their names more frequently than those whose first names are disliked by the group.
3. Individuals who dislike their own first name tend to be less self-accepting than individuals who like or are indifferent to their own first names.
4. Individuals who like their own first name tend to

identify with the name, i.e., answer "yes" to the question, "Do you feel your first name is you?"

5. Group-wide liking for first name has, however, not been found to be related to individual identification with own name.

6. While the majority of individuals with names disliked by the group liked their own names, a statistically significant difference between those who like and those who are indifferent to or dislike their first names was not found.

7. Individuals who have unique names and like them tend to be higher in self-acceptance than individuals who have unique names and dislike or are indifferent to them.

8. An incidental finding was that 21 of 23 names marked as unique were also disliked by either the college or high school subjects. This may throw some light on studies which found that males with unique names tend to be more disturbed than males with common names. At the same time it merits further exploration.

9. It was also found that college students tend as a group to be higher in self-acceptance than high school students, which points up the need for studies of the correlates of self-acceptance.

An analysis of the high as compared with the relatively low in self-acceptance among the 46 subjects who dislike their first names, reveals that some of the factors which may cause exceptions to the finding that individuals who dislike their first names tend to be lower in self-acceptance than those who like or are indifferent to their first names, are: 1) lack of identification or association with the disliked name; 2) dislike a reflection of group-wide attitudes; and 3) dislike operative in one setting (peer group) and not another (family).

Implications

The results are interpreted as substantiating the theoretical position which is based chiefly on a Gestalt psychological approach.

It is noted that dislike for a name with which the individual does not choose to identify, but which is "associated" with him (i.e., he is called the name by either family or friends or both) is also usually related to a relatively low level of self-acceptance. The possibility is raised that dislike for other major aspects of the self-organization (e.g., ethnic or racial group) with which the individual does not choose to identify but which are "objectively" associated with him, is also related to self-rejection.

The suggestion is made that a similar method be used to explore "group-wide" attitudes as they are related to "individual" attitudes and to self-acceptance and self-identity with respect to such other major aspects of the self as body build, age, sex, occupation, socio-economic, ethnic, racial and other reference groups.

135 pages. \$2.00. Mic 57-2945

AN EXPLORATORY STUDY OF ALTRUISM

(Publication No. 21,852)

Robert Winslow Friedrichs, Ph.D.
The University of Wisconsin, 1957

Supervisor: Professor Burton Fisher

Noting the limited concern of the sociologist with ethical behavior in general and the absence of relatively precise measurement of altruism in particular--to say nothing of a quantitatively oriented analysis of its functional significance, the author administered a paper-and-pencil questionnaire covering 40 relevant measures to 280 male members of five Columbia University social fraternities. The focal device for the estimation of altruism took the form of a quasi-sociometric rating of a subject's tendency "...to inhibit (or control) his own impulses and desires in order to make it possible for others to express or satisfy theirs." In an attempt to approximate the measure while eliminating the cumbersome rating procedure, the subjects were asked to indicate their probable behavior in twenty hypothetical situations providing altruistic, utilitarian, and egoistic alternatives.

That the quasi-sociometric rating achieved a semblance of success in the identification and measurement of altruism is suggested by the relative consensus of the ratings of a particular subject coupled with a relatively wide range of differentiation between subjects; by the reliability of a subject's mean rating (a random sample demonstrating a .97 split-half coefficient); and by the fact that it could not be equated with or reduced to such similar characteristics as social acceptability and popularity. It did appear to possess, however, a biased sensitivity toward in-group expressions of altruism and to reflect partial confusion with elements representative of familiar associations. Its significance functionally vis a vis a range of variables generally considered of central concern in most contemporary analyses of social interaction is indicated by the fact that it contributed the second largest amount to the communalities involved in a factor analysis of a 24 x 24 matrix.

The situational items demonstrated little statistical unity, although they evidenced a test-retest coefficient of .88. They appeared to possess a biased sensitivity to the ethic of the "emancipated" intellectual and to reflect knowledge of propriety perhaps more than actual behavior. The two approaches to altruism correlated significantly at the 1% level, but one appeared to possess no practical utility for the prediction of the other ($r = .15$).

Hypotheses stemming from a correlational and factor analysis of these measures of altruism and other measures included in the study which appear most worthy of more detailed examination include:

Altruistic behavior appears of paramount value to acceptability within an in-group.

Altruistic behavior is integral to the empirical referents of the "sacred" construct.

A "sacred" configuration is more conducive to the appearance of altruism than such components of the "sacred" construct as religiosity, low population density, ethnocentrism, authoritarianism, political conservatism, low "cultural" and economic aspiration, personal morale and mental health, sociability, and membership in relatively non-permissive but sizable families of low income when these characteristics are taken alone.

Ethnocentric individuals are not likely to be egoistic in in-group relationships; if "authoritarian" in underlying make-up, they are likely to be relatively altruistic.

Acceptance by others reflects to but a limited degree the acceptance of others and vice versa.

An approved trait does not tend to be projected by the non-insightful.

Socio-economic status leads to relatively egoistic behavior, though it is tempered where responsibility and security are maximized.

Altruistic behavior is positively related to theistic attitudes but not to mere attendance at public worship.

Professed ease in social situations is not correlated with altruism; placing value upon them is.

There is no positive linear correlation between inhibitory altruistic behavior and neurotic symptomology.

Differentials in relative altruism among major faith groupings disappear upon control of relative urbanization and secularity. Altruism is most likely to accompany theism among Jews. 362 pages. \$4.65. Mic 57-2946

SOME DIFFERENCES BETWEEN ACCEPTED AND REJECTED MEMBERS OF EFFECTIVE AND INEFFECTIVE GROUPS

(Publication No. 22,048)

Bertram Gold, Ph.D.
Columbia University, 1957

This research was designed to (1) determine the personality, perceptual, and behavioral differences between highly accepted and highly rejected individuals, and (2) to determine whether effective crews differed from less effective crews in the types of individuals who were highly accepted and highly rejected.

The population studied was composed of 32 radar crews consisting of a total of 250 individuals. These individuals were differentiated according to formal positions within the crews, that is those crew members with higher rank in the more essential positions were designated as having high formal status, while all other crew members were considered as having low formal status.

A criterion of sociometric acceptance was derived from the within crew choices made by each crew member. Two sociometric criterion groups, namely a group composed of individuals receiving high sociometric acceptance (liked best) and a group composed of individuals receiving low sociometric acceptance (liked least), were developed by treating the choice data in terms of a binomial model.

A reliable measure of radar crew performance was developed by observing the crews for a three month period and determining the ability of the crew members to locate aircraft. The crews were then classified into high and low performance groups.

Personality data consisting of scores on an anxiety scale and scores on a standard military test of general intelligence were secured from each individual. The perception of interpersonal relations among crew members was measured by a questionnaire consisting of four subscales, namely harmony, procedural clarity, intimacy, and stratification. In addition, perceptual measures of the amount of consideration and initiating structure behavior shown by the formal crew leader were obtained. A reliable

behavioral measure of the frequency of individual verbal interaction was based on the observation of each crew in a group problem solving situation.

The data were treated by the analysis of variance, using as classificatory criteria the level of sociometric acceptance and the level of crew performance. Since each criterion was dichotomous, a two-by-two factorial design was used.

High formal status individuals were found to receive greater acceptance than low formal status individuals. This required that the differences between highly accepted and highly rejected individuals be separately analyzed for each level of formal status.

Accepted individuals of low formal status had higher intelligence and lower anxiety scores than rejected individuals. Among high formal status individuals, acceptance was positively related to intelligence, but no relationship was observed between anxiety and acceptance.

Among both high and low formal status individuals, no relationships were found between acceptance and the measures of harmony, procedural clarity, and intimacy. High

acceptance was associated with high stratification for high formal status individuals, but this relationship was not observed with low formal status individuals. The consideration and initiating structure measures were not related to the acceptance and crew performance criteria.

Acceptance was positively related to interaction frequency for both levels of formal status. High frequency of interaction was taken as a definition of leadership, and the relationship between acceptance and leadership was discussed.

Only one measure, the perception of crew harmony, differentiated the sociometric criterion members of effective crews from their counterparts in less effective crews. In both the high and low formal status samples, the sociometric criterion members of the effective crews described the interpersonal relationships among crew members as being less harmonious than the sociometric criterion members of the less effective crews. An explanation based on the greater awareness of social rankings within the crew by members of the high performance crews was offered to account for this finding.

101 pages. \$2.00. Mic 57-2947

SOCIOLOGY

SOCIOLOGY, GENERAL

THE EFFECTS OF THREE STYLES OF INTERVIEWING ON THE RESPONSES OF WOMEN FROM TWO CONTRASTING SOCIO-ECONOMIC GROUPS

(Publication No. 21,628)

Arthur S. Barron, Ph.D.
Columbia University, 1957

214 women were interviewed in this study. 94 were full-time factory workers and members of the International Ladies Garment Workers Union. These were designated as lower class respondents. 120 were full-time housewives and members of the national women's Zionist organization, Hadassah. These were designated as middle class respondents.

Three styles of interviewing were used with these respondents. One third of the women in both groups were interviewed with stress techniques. These techniques enabled the interviewer to appear as hostile and suspicious. One third of the women were interviewed with high rapport techniques. These techniques enabled the interviewer to appear as friendly and supportive. One third of the women were interviewed with neutral techniques. These enabled the interviewer to appear as objective and business-like.

The effects of these three styles of interviewing on response were explored. Specifically, the impact of style of interviewing on validity of response, reliability of response, self-incrimination in response (i.e., the degree to which a respondent can "admit" to things about himself which ordinarily bring social disapproval), and "don't know" as response was determined.

The data which emerge indicate that style of interviewing has a significant impact on response. Greatest validity of response in the study was produced by stress; least validity was produced by rapport, and neutral interviewing produced intermediate validity. The greatest number of self-incriminatory responses were obtained with rapport, and the least were obtained with stress. Neutrality produced intermediate effects. By and large, stress produced the greatest share of "don't know" responses, neutral and rapport interviewing the least. Interestingly, style of interviewing appeared to have no effect on the reliability of response. Stability of response was measured only under stress conditions.

These effects, however, were influenced by the degree of salience or interest of the topic to the respondent. The questionnaire used in this study covered four substantive areas: farming, Zionism, labor, and marriage. These subjects represented varying degrees of salience and interest to respondents. This was measured by a "secret ballot" administered to the women at the conclusion of each interview. The findings indicate that reliability and stability of response are greatest on issues which are very close to respondents; "don't know" responses and valid responses are fewest on such issues.

Consistent differences emerge in the responses of Union and Hadassah respondents. The former typically evidence greater invalidity, unreliability, and instability of response than the latter. They also offer fewer self-incriminating responses, and provide a far greater proportion of "don't know" responses.

Differences are also noted in the spontaneous remarks made by Union and Hadassah women about the interviewer, the interview itself, and their own behavior. Union women typically make hostile and suspicious comments. Hadassah

women typically make supportive and apologetic comments. These reactions seem to proceed from different images of the interview held by Union and Hadassah women. The former apparently view the interview as threatening. The latter view it as a chance to display knowledge or to participate in a prestige-giving activity. These images seem to be related to the fact of socio-economic class.

Conclusions were drawn from these findings on the issue of survey research design as it relates to style of interviewing, on the significance of situational determinants in response, on the importance of the dimensions of salience and interest of topic in response, and on the role of socio-economic factors in the interview process.

204 pages. \$2.65. Mic 57-2948

THE ROLE OF THE PATIENT IN A HOSPITAL WARD

(Publication No. 22,040)

Rose Laub Coser, Ph.D.
Columbia University, 1957

This study, which aims to describe and analyze several aspects of the social role of the patient in a ward of a general hospital, was conducted at a large metropolitan teaching hospital on the Atlantic seaboard. The field work was conducted during the summer and fall of 1954 and involved intensive observations in the ward, informal conversations, as well as standardized interviews with patients, nurses and doctors. Observations of admission procedures and of the behavior of patients on the ward, as well as formal interviews at discharge, were designed to provide clues to an understanding of the process of adaptation to the role of patienthood.

Among the factors affecting patients at admission to a hospital ward are anxiety about their physical condition, separation from family, friends and familiar surrounding in general, interruption of activities, their surrender of control over their "own" time, their "own" rhythm of activities, and decision-making generally. In this condition of reduced autonomy patients face an environment alien to them. Many of them do not sufficiently understand and are not psychologically equipped, nor are they given sufficient opportunity, to understand, the meaning of medical and nursing procedures or of the roles played by the many "persons in white."

The formal authority structure on the medical and surgical wards and difficulties in communication between doctors and patients at first admission provide a context for examining the part played by doctors, nurses and patients in the socialization of newly-admitted patients. The most effective agents of socialization are evidently the patients already in the hospital, who provide mutual social support, explain the meanings of procedures and rules, and provide information (in the form of gossip and jocular talk) about hospital personnel.

An analysis of formal interviews with patients at discharge distinguishes two types of adaptation of patients to the hospital. Some patients tended to consider the hospital and doctors as means for the gratification of primary needs: they felt that the hospital provided a "home" and expected emotional support from the doctor. In contrast, other patients considered hospital and doctors instrumen-

tally: they felt that the hospital offered technical, medical and nursing facilities, and judged a doctor according to his professional competence. A comparison of these two types of patients revealed that those with a primary orientation were more ready to accept the hospital setting than the instrumentally oriented: they felt less deprived of relatives, friends and activities at home, and could not make any suggestions for the possible improvement of patients' comfort on the ward; moreover, they were more likely to define a "good patient" as one who is completely submissive to hospital authorities, in contrast to the instrumentally oriented patients who more often felt that a "good" patient was one who maintained some degree of autonomy. When these two types of patients were further compared with regard to their anticipation of activities after leaving the hospital, the instrumentally oriented patients more frequently mentioned relationships with others, or activities, in answer to the question: "What will be the first thing you'll do when getting home?" The primary oriented patients more often mentioned passive behavior. We concluded that primary orientation seemed to be associated with acceptance of the hospital structure, as well as with lack of readiness to abandon the patient role.

Several distinct but interrelated factors help account for the two types of adaptation of patients to hospital life. Types of illness, differences in the organization and authority structure of the wards and the attendant differences in the roles of nurses on these wards, the number of admissions to the hospital, age and marital status, were all shown to be related to attitudes toward hospital or doctor and toward deprivation in the hospital setting, to degree of identification with the hospital, and to anticipation of post-hospitalization behavior.

The analysis of determinants of adaptation of patients primarily focused on three main factors: (1) the degree to which a patient is relieved of the responsibility for making decisions about his behavior (differences in ward structure); (2) the frequency with which he is relieved of responsibility (frequency of hospitalization); and (3) his possible exemption from responsibilities before admission (chronic illness and old age).

This analysis of the role of the patient in the ward led to the conclusion that present roles within the structure of the ward as well as the interrelations between these roles and past roles outside the hospital greatly affect the adaptive behavior of patients.

414 pages. \$5.30. Mic 57-2949

A PILOT STUDY OF PROTESTANT CHURCH-RELATED SOCIAL WELFARE IN THE U. S. A.:

A National Survey of Social Welfare Agencies
Sponsored, Operated or Related to the
Protestant Denominations

(Publication No. 21,725)

Ruth Lavery, Ed.D.
New York University, 1957

Chairman: Professor H. H. Giles

Historically, social work originated in the church and, in the United States, it preceded organized welfare. Secular

social work grew rapidly in the post-Civil War era, and welfare leadership shifted from the church to the community. Yet the Protestant Churches continued to create new agencies where human needs were greatest and community resources scarce.

Many radical changes have taken place in American society in the last century. Some church agencies have kept pace with modern welfare methods, while others have undergone relatively little change. There is no single national comprehensive body of facts pertaining to Protestant welfare. Coupled with denominational diversity, there is a lack of unity in Protestant social work. Church leaders, aware of the need to reevaluate the role of the churches in social welfare, are thereby hampered in program planning for more effective service.

This pilot study, in documenting a sample of the social work of the churches, presents a method by which similar data can be collected and analyzed in comparison with Protestant social welfare, generally, as a step toward coordination and cooperation.

Criteria for Protestant-relatedness were developed and tested with 100 religious and secular agencies and councils of churches (liaison between church and community). After several pretests and revisions, these criteria were formulated into the Identification Questionnaire.

Directories were obtained nationally from 80% of councils of agencies and chests. The remaining 20% represented fund-raising chests in small localities with no welfare function. The Identification Questionnaire was sent to 1,730 agencies which could not be denominationally identified by directory description, in a selected sample of ten states. The purpose was to learn how many Protestant agencies there were which were not known to denominational headquarters. Findings revealed that 92% of Protestant self-identified agencies, denominationally unknown, had no official religious recognition. Their identification was based on the concept of "Christian" as "humane" rather than on recognized church relationship. The universe was therefore limited to denominationally recognized agencies. While not complete, this method presents a reasonably comprehensive national picture of Protestant social welfare.

A detailed questionnaire was developed covering stated denominational interests, at several meetings held in various cities and attended by church representatives. The questionnaire included denominational relationship, basis of religious identification, year of origin, function, geographic distribution, location by population density, manner of religious control, religious assistance, number and type of personnel, number of people served, contributed and earned income, capital assets and future expansion, all based on 1954 figures.

A list of 2,859 related agencies operating 3,383 services was submitted by 21 denominations. The questionnaire was sent to the entire listing. Respondents in the given two-week period, numbered 986 or 34%. The survey is based on this sample.

The findings reveal that Protestant welfare includes a wide range of services affecting every area of living. The agencies are widely distributed in rural, suburban and urban areas. Most agencies are non-sectarian in service, but religion is an integral part of program. Governing boards and directors are generally required to be denominationally related while most staff need not be. Religious auspices have final authority in over one-half of the

agencies. Sponsoring religious bodies provide many kinds of assistance as well as partial support. Financial support is derived largely from earnings. Non-religious sources contribute a far greater portion of donated income than do religious sources. The greatest investment is in buildings, land and equipment, and planned future expansion will follow the same course.

This pilot study provides the basic information about Protestant social welfare from which further detailed studies may be made, to form a sound body of facts for the use of church leaders who seek to make more effective the social work of the Protestant Churches.

645 pages. \$8.20. Mic 57-2950

SOCIAL GOALS AND SOCIAL PARTICIPATION AMONG URBAN LOWER CLASS WHITE MALES

(Publication No. 21,833)

Robert Dewhirst Vinter, Jr., Ph.D.
Columbia University, 1957

Chairman: Goodwin Watson

Concern with participation in community groups is persistently expressed by the citizen, the social scientist, and by organizational leadership. Previous studies indicate that participation varies inversely with social class. This exploratory research focuses on influences affecting participatory behavior among white lower class males.

The means-end schema proposed by Professor Robert K. Merton provides a framework for the study. Dissociation between universally prescribed monetary-success goals and differentially available means to goal attainment characterizes American society. The dissociation induces deviancy and anomie, greater for the lower strata, because of limited access to institutionalized means. Community group participation is regarded as instrumental to success goal achievement and in conformity with social norms. Defined as desire for economic affluence and social ascent, monetary-success goals are the independent variable of the study. It is expected that success goals are attenuated among members of the lower class. Those not holding success goals will tend to restrict participation to informal primary associations, and to participate infrequently in secondary groups. Reactions of anomie and frustration will characterize individuals who do not hold success goals, while aspirations will be transferred to children.

Interaction between the main variables and additional subjective orientations and characteristics are also observed; viz., class identification, age, education, income, and occupation. The chi-square test is the measure of association, with significance established at the five per cent level. A census tract in Springfield, Massachusetts, containing a large proportion of white lower class males, is selected by use of demographic indices. A sample of fifty white males is randomly chosen from the fathers of all children living in the tract and attending three public elementary school grades. The research proceeds by semi-structured interviewing of sample individuals.

Study results clearly demonstrate that personal success goals are attenuated within the sample, although success

values are retained. Security goals, defined as aspirations to maintain present socio-economic levels, are as typical as success aspirations. Success goals are associated with middle-class identifications and objective characteristics, particularly occupational level. Kinship associations predominate over friendship associations, with pervasive mutual distrust among neighborhood co-residents. Secondary group participation is largely restricted to union or church memberships. Relationships between goals and social participation patterns are not statistically significant. However, the data are consistently in the direction of increased organizational participation with stronger success orientations. Primary group participation is associated with security goals, although less markedly. Unanticipated findings include the emergence of a norm of organizational participation, and an association between success goals and absence of local kin. There is a general tendency to maintain high aspirations for children. Anomie is inversely associated with success goals and with all forms of social participation. Frustration behavior data are fragmentary and ambiguous.

It is concluded that success goals and other subjective orientations are meaningfully related to social participation. The middle class serves as a broad reference group for white lower class males, especially those who seem to have achieved some movement toward the valued stratum. Goal attenuation and increasing anomie are associated with aging, as success seems less possible. Aspirations for children are compensatory for or reinforcing of self-aspirations. Participation in community groups is viewed as anticipatory socialization for success-oriented individuals who identify with the middle class. Deterioration of primary relations is dysfunctional to high organizational participation. Kinship relations continue to serve special functions for lower class members, contributing to the maintenance of adequate self-images, and offering protective services in lieu of organizational affiliations. Organizations must adopt a strategy consistent with the varying orientations, needs, and abilities of lower class individuals. Such a strategy must recognize the importance of primary relations. 219 pages. \$2.85. Mic 57-2951

SOCIOLOGY, PUBLIC WELFARE

THE RELATIONSHIP OF VOLUNTARY AND STATUTORY WELFARE SERVICES IN ENGLAND

(Publication No. 21,641)

Samuel Mencher, D.S.W.
Columbia University, 1957

The relationship of voluntary and statutory effort has become an increasingly important aspect of welfare planning in countries whose welfare services are provided by both voluntary and statutory organizations. The growth of statutory responsibility and the desire to make the most effective use of voluntary resources have resulted in attention being given to the respective roles of voluntary and statutory services and to the techniques for their coordination. The rapid development of statutory programs

in England following World War II has provided an opportunity to observe the changing pattern of statutory-voluntary relationships in a nation traditionally favorable to voluntary welfare services.

This study has concentrated on the relationships of voluntary and statutory bodies serving two major groups on the British welfare scene: children and the aged. In the case of both, voluntary effort had been prominent before the expansion of statutory services after the National Assistance and Children Acts of 1948. Services for children and the aged have offered a comparison of voluntary-statutory relationships in regard to: (1) statutory policy, (2) the roles of voluntary effort, and (3) the structure of the voluntary services. The statutory-voluntary relationships have been examined on the national and local levels, but particular attention has been given to the local areas where the basic responsibility for the provision of services falls. For this purpose, field studies were made of statutory and voluntary services and their relationship in three local authority areas.

Since 1948, welfare programs for the aged, as compared to those for children, have shown a growth both of voluntary activity generally and of statutory use of voluntary services. The primary role of the voluntary child care agencies has been rapidly taken over by the local authority children's departments with the support of the Home Office. This trend has been influenced by: (1) differences in philosophy and methods of care of the voluntary and statutory bodies; (2) the inability and unwillingness of many voluntary societies to adjust to the changing nature of child care and the changing roles in relation to the expanding statutory services; and (3) the national character of the major voluntary agencies which has limited the possibilities for cooperation and support on the local level where statutory child care services are administered.

Voluntary services for the aged, on the other hand, have been encouraged by the central government, which has delegated many important functions to them. The great need for facilities and services for the aged and the fact that voluntary services are locally sponsored and supported by unpaid volunteers and the aged themselves have also been influential in their development. However, even in services for the aged some of the same pressures toward greater statutory control, noted in the children's field, have been observable. Despite central government policy, the local authorities have shown a tendency toward fulfilling their responsibilities through the statutory structure or voluntary activities closely identified with it.

An examination of the three major roles of voluntary effort in relation to statutory welfare programs: service, coordination, and leadership, has indicated that the role and organization of voluntary services may need to be re-evaluated in view of the limited voluntary resources and the growing nature of statutory responsibility. Possibilities exist, however, for a variety of relationships between voluntary and statutory efforts which permits both satisfying and constructive roles for voluntary activity as well as participation with statutory bodies in the provision of welfare services. 427 pages. \$5.45. Mic 57-2952

SOCIOLOGY, RACE QUESTION

NEGRO RACIAL THOUGHT IN THE AGE OF
BOOKER T. WASHINGTON, CIRCA 1880-1915

(Publication No. 22,058)

August Meier, Ph.D.
Columbia University, 1957

Worsening conditions in the years following the close of Reconstruction led Negro leaders to shift their point of view from one that placed primary emphasis on agitation, political rights and immediate integration to one that placed primary emphasis on economic development, self-help and racial solidarity, and -- in the South -- upon a conciliatory approach to the superordinate white race. The protest tradition however, always remained significant.

Booker T. Washington's program therefore was not really original. He espoused economic development and industrial education, self-help and racial solidarity, and conciliation of the white South by a seeming acceptance of segregation and disfranchisement. On the other hand, behind his accommodating facade, Washington played an important political role, and secretly engaged in activities aimed at undermining disfranchisement and segregation.

The salient ideological expression of the period involved a belief in the value of self-help and racial solidarity. This viewpoint permeated the thinking of the great majority of leaders -- whether accommodators or agitators -- and was applied with equal fervor to both agitation and economic elevation. The pervasiveness of this feeling is illustrated by the development of welfare and fraternal and business institutions, by the vogue of all-Negro communities, and by the philosophies that these enunciated. The stress upon self-help and racial solidarity, particularly in its application to the advocacy of the development of Negro business through the patronage of the Negro masses, was in large part related to the rise to prominence of an urban entrepreneurial and professional middle class that depended for its livelihood upon the support of the Negro masses.

A small minority of college-trained and professional men led the way in opposing Booker Washington and his philosophy, and their efforts culminated in the formation of the National Association for the Advancement of Colored People, which was established with the assistance of white liberals. However the majority of Negro professional men -- and practically all of the politicians -- were either enthusiastic or moderate supporters of Booker Washington, though they did not necessarily subscribe to the accommodating phases of his philosophy. Moreover, not all of the Negro "radicals" were consistently anti-Washington, or even consistently opposed to the Tuskegeean's emphasis on racial solidarity rather than on assimilation, and on economics rather than politics. Thus the college graduates and professional men -- Du Bois' "talented tenth," who were the chief leaders among American Negroes -- tended by and large to be supporters of Washington and of much of his philosophy.

Finally, the roots of the urban "New Negro" of the 1920's, with his emphasis upon race solidarity and race pride and race union in order to effect racial advancement -- and of the associated cultural flowering known as the Harlem Renaissance -- are to be found in the intellectual and social movements of the first part of the twentieth

century: in the beginnings of urbanization and northward migration, in the rise of a Negro entrepreneurial class dependent on the support of the Negro masses, in the literary awakening that began around 1900, and in the popularity of the ideologies of racial self-help and solidarity.

989 pages. \$12.36. Mic 57-2953

SOCIOLOGY, SOCIALISM, COMMUNISM,
ANARCHISMGENERATIONAL DIFFERENCES IN
THE SOVIET UNION

(Publication No. 21,650)

Alice S. Rossi, Ph.D.
Columbia University, 1957

This study of generational differences in the Soviet Union attempted to determine to what extent and in what areas of life experiences, attitudes and values, the younger Soviet generation comprise different social-political beings than the older Soviet generation. The data in this study consist of written questionnaires and detailed life histories administered in Europe to Soviet emigres as part of the Harvard Project on the Soviet Social System. Since the older emigres were born, reared and schooled before the Soviet regime was established, and the younger emigres were born and grew to adulthood completely during the Soviet era, a comparison of these groups permitted a study of the kinds of social-psychological changes which are emerging in the Soviet population.

Among the major contrasts this study revealed are the following: (1) The younger generation places more stress on the values of "prestige", "esteem" and "mobility" as the attributes of jobs they would like to have for themselves and for their children, than the older generation does. (2) An increasing emphasis is found in the younger generation on aspirations for non-manual jobs in the intelligentsia and white collar categories of occupations; (3) The younger generation shows a considerably higher level of both educational and occupational satisfaction than the older generation. (4) The younger generation is much less fraught with anxiety and fear about the condition of life and work in the Soviet Union than the older generation. (5) The younger generation is more committed to Soviet ideology and more favorable in its assessment of the accomplishments of the Soviet regime than the older generation is. (6) There has been an overall generational trend away from strong adherence to religious precept and practice in the direction of either a mild religious orientation or more definite anti-religious positions of agnosticism and atheism among the younger generation. (7) The younger generation is less apt than the older generation to become disaffected from the Soviet regime for ideological reasons: the older emigres reject the regime for ideological principles or lack of freedom, whereas the younger emigres more frequently reject the regime as a result of their exposure to the West, the failure of the regime to fulfill promises, and their generally low standard of living. (8) Although the majority of the emigres

reject the kolkhozes, there are important though subtle differences between the generations in their reasons for holding this view: the older generation rejects the collective farms because they violate an old well-established form of rural social organization, radically changing the peasants' traditional relationship to the soil and the fabric of their interpersonal life; the younger generation shows a tendency to shift away from this traditional reason and instead places great emphasis on the deprivational fea-

tures of kolkhoz life -- a rejection not in value terms but for the poor material conditions of the kolkhoznik's existence. (9) A qualitative analysis of the emigres' perception of generational differences indicated that there does not seem to be any really sharp alienation and conflict of any open sort between the generations. Although there are consistent and marked differences between the generations, these differences do not constitute any rigid line of felt cleavage and open hostility between the generations.

564 pages. \$7.15. Mic 57-2954

SPEECH - THEATER

AMERICA'S TOWN MEETING OF THE AIR, 1935-1950. A CRITICAL AND RHETORICAL ANALYSIS.

(Publication No. 21,606)

Robert LeRoy Gregg, Ph.D.
Columbia University, 1957

Chairman: Magdalene E. Kramer

The fundamental problem of this study was two-fold: first, to discover the rhetorical theory basic to America's Town Meeting of the Air, and second, to determine the kind of public address represented by America's Town Meeting of the Air, 1935 to 1950.

The study was undertaken because many authors of textbooks in public address and in related fields referred to America's Town Meeting of the Air as an outstanding example of radio discussion. Others, a smaller number, cited it as an outstanding example of radio debate and of radio forum. It seemed important, therefore, to determine the type of public address primarily represented by America's Town Meeting of the Air.

In order to find an answer to the proposed problem, the author proceeded as follows: (1) studied the social, political, and economic background of the historical period involved and the development of radio broadcasting in order to show the forces behind the origin of America's Town Meeting of the Air; (2) developed the history of the program and its relation to the League for Political Education, from information obtained through examination of publications and through interviews with people connected with America's Town Meeting of the Air; (3) compiled a list of 614 broadcasts of America's Town Meeting of the Air between 1935 and 1950; (4) selected on the basis of certain criteria 114 representative transcriptions for detailed analysis; (5) analysed the 114 transcriptions for: format, problems considered, participants, roles fulfilled, procedures, achievement of stated values; (6) studied classical rhetoric and its application to modern public address; (7) analysed America's Town Meeting of the Air in relation to concepts of classical rhetoric and modern public address.

The following conclusions may be drawn from the assembled data:

1. During the period studied, 1935-1950, the American people were motivated by the social, political, and eco-

nomie situation to seek information about current problems. The rapid extension of radio broadcasting production provided a means for satisfying their apparent desire for such information. Hence, America's Town Meeting of the Air was a natural outgrowth of the historical period.

2. America's Town Meeting of the Air was amazingly consistent in regard to format and in regard to the roles the participants, moderator, speakers, and audience fulfilled.

3. The rhetorical principles basic to America's Town Meeting of the Air are primarily Aristotelian in nature.

4. Because of specific characteristics, part of America's Town Meeting of the Air may be classified as a debate and part as a forum.

Therefore, it may be concluded that America's Town Meeting of the Air, instead of being referred to as a radio discussion, should, in reality, be classified as a radio debate-forum.

298 pages. \$3.85. Mic 57-2955

READING ALOUD AND EXTEMPORANEOUS SPEAKING ON THE RADIO

(Publication No. 21,810)

Richard Arthur Norman, Ph.D.
Columbia University, 1957

The main purpose of the study was to compare the style of language and speech used in radio broadcasts by a number of well-known speakers who read aloud from their prepared manuscripts and spoke extemporaneously with the style recommended by writers on public speaking and on radio speaking. The writer was also interested in determining the differences in style of composition and of speaking between the speech read aloud and the extemporaneous speaking of the speakers studied. Factors of speech composition which were analyzed and compared included rhetorical uses (illustrations, figurative language, questions, parallel constructions, etc.), vocabulary, sentence length and structure, and grammar. Factors in manner of speaking studied included average syllable and word rate, phrasing, pronunciation, use of "form-words," incidence of emphatic sense stress, types and degree of "non-fluencies," pitch, and volume.

Tape recordings were made of the speaking of fifteen speakers who had broadcast on "America's Town Meeting of the Air," a radio program which allowed for both reading aloud and speaking extemporaneously on the same topic by the same person. The speech of seven of the speakers who were heard on two of these broadcasts was analyzed for its consistency from one broadcast to another. The tape recordings of the speech and the phonetic transcriptions made from them served as the bases for the critical and phonetic analyses of the aspects of speech studied. The style of speech in each of the two forms of speaking was compared with the recommendations on style in public speaking enunciated by rhetoricians and "elocutionists" in the past, and on style of radio speaking by modern writers in order to determine the approximate degree of correspondence of the speech to these recommendations.

The findings of the study indicate that the speech read aloud conformed more nearly than did the extemporaneous speaking to the recommendations of authors in respect to the following elements: clearly related illustrations, sentence length, grammar, rate of speaking, phrasing, pronunciation, volume, and fluency. The extemporaneous speaking corresponded more to the recommendations in variety of sentence length, vocabulary, and the use of personal words and contractions. The greatest divergencies between the recommendations and the speaking occurred in rate, which was often considerably faster than

prescribed, in sentence length, which was longer, on the average, than suggested, in sentence structure, which was frequently more complicated than counseled, and in fluency, which was often lacking, most particularly in extemporaneous speech.

The extemporaneous speech studied was characterized by more "starter" and "filler" words, qualifying phrases, personal words, contractions, "non-fluencies," colloquial and dialectal words than were found in the speech read aloud. Sentences were longer and sentence structure often more involved. There were more instances of dubious grammatical usage. Average word and syllable rate were slightly higher, and there were more instances of slackness in articulation. Intonation patterns seemed to have been more varied, and there were indications of more variation in volume. In the speech read aloud there was a greater use of rhetorical devices and of literary and difficult words than in the extemporaneous speech. A greater correspondence of word grouping to thought grouping was noted in the speech read aloud. Speakers who were represented by two broadcasts were consistent from one broadcast to another in having more "non-fluencies," a wider range of sentence lengths, a more rapid syllable rate, and more compound-complex sentences in extemporaneous speaking than in speech read aloud. Speakers consistently had a higher percentage of word-group thought-group correspondence in speech read aloud.

166 pages. \$2.20. Mic 57-2956

ZOOLOGY

TOXOPLASMA IN WILD BIRDS

(Publication No. 21,912)

Peter Stevenson Finlay, Ph.D.
Syracuse University, 1957

Toxoplasma gondii is a protozoon parasite that was first found in an African rodent. Contrary to most parasites this organism exhibits an extremely broad host range. Naturally acquired infections have been identified in at least 23 species of mammals belonging to 7 orders, and cases of *Toxoplasma* have been confirmed by transmission from birds to mammals in at least 3 avian species. Experimentally, attempts to infect various species of warm-blooded animals have been almost universally successful. Infections in humans which may be serious and sometimes fatal, particularly in infants have been described.

Because birds of many species may be easily infected experimentally and as at least 3 species have been shown to be capable of maintaining naturally acquired infections that may be transmitted to a mammalian host it seems likely that other naturally acquired avian infections exist. For this reason a survey of wild birds was undertaken in an attempt to find such naturally acquired infections.

As morphology alone has proved unreliable in detecting infections of *Toxoplasma*, transmission to mice was used as the basis of identification in this work. Any strain of

the parasite could then be compared with a known strain maintained in the laboratory as to morphology and behavior in other experimental hosts.

Brain material from birds brought to the laboratory for examination was homogenized in physiological saline and a portion of the homogenate injected into a series of mice. After an observation period of ten days to two weeks mice of the first series were sacrificed and an homogenate of the brains, lungs, livers and spleens was passed to a second series of mice. Serial passages were continued in cases where symptoms of infection were observed.

From a group of 211 birds representing eight species a single strain of *Toxoplasma* was isolated. Symptoms of infection were first observed in two of six mice which had received homogenized brain material containing the brains of four crows. Parasites were demonstrated in the peritoneal exudate of one of these two mice and their tissues proved infective for other mice. The strain has been carried through over sixty serial passages in mice. As a total of 108 crows were examined the incidence of infection as measured by the method of examination used was on the order of one percent.

The crow strain was studied as to morphology and comparison with the RH strain of *Toxoplasma* revealed no significant structural differences. Attempts at experimental infection of common laboratory animals showed that the crow strain produced an acute fatal infection in

mice, rabbits and hamsters and an asymptomatic chronic infection in albino rats.

Crows maintained in the laboratory were inoculated with parasites of the RH strain and positive infections were found in three of thirteen birds. The results showed that viable parasites were present in the blood and other tissues for short periods of time.

92 pages. \$2.00. Mic 57-2957

HABITAT PREFERENCES AMONG REPRESENTATIVE WINTERING AND BREEDING BIRDS OF THE CENTRAL OKLAHOMA FOREST-PRAIRIE ECOTONE

(Publication No. 21,885)

John Christopher Johnson, Jr., Ph.D.
The University of Oklahoma, 1957

Major Professor: George Miksch Sutton

Vegetation is a prime determiner of bird distribution. The forest-prairie ecotone of central Oklahoma, a broad transition region of blackjack and post oak savannah, well-wooded ravines, and grassland, is of special interest to ecologists because of the variety of strongly contrasting animal habitats found within it. To determine the pattern of distribution of wintering and breeding birds in this ecotone a study of habitat preferences was made. Field work continued from 1952 to 1955.

In 1954-1955 the winter birds of two large tracts (one in woodland, one in grassland) and the breeding birds of four plots (three in woodland, one in grassland) were regularly censused. The tracts and plots were believed to be representative of the ecotone vegetationally speaking, so most of the 41 species of winter birds and 43 species of breeding birds were considered representative also. The study-area species just mentioned did not by any means include all birds known to winter and breed in the forest-prairie ecotone of central Oklahoma.

Of the 41 species of winter birds studied, 28 were resident, 13 visitant. Some resident species were strictly non-migratory, others more or less migratory. Twenty species of winter birds were seen regularly in both prairie and savannah, eight others principally in the savannah, 13 others principally in the prairie. Three were virtually restricted to the savannah, seven to the prairie. Several were found only in edge habitat, none only in "non-edge" habitat. Twenty-five occurred more or less regularly in flocks, six usually in mixed flocks.

The Cassin's Sparrow, found breeding for the first time in central Oklahoma during the summer of 1955, and discussed because it bred within the grassland study-area, probably is not truly representative of the forest-prairie ecotone. The Broad-winged Hawk, also discussed, is hardly representative. Of the 41 other species of breeding birds, 17 were resident, 24 visitant. Eleven resident species seen in winter did not inhabit the four plots censused in summer. Twenty-one species of breeding birds were not noticeably more abundant in either savannah or prairie. Wherever the more arboreal of these inhabited the prairie, they nested principally in the wooded ravines. Of ten species found primarily in the savannah, three were restricted to bottomland forest, one to upland forest.

The more arboreal of ten species found principally in the prairie nested as a rule in solitary trees or in widely-spaced thickets or clumps of shrubbery. Several resident species inhabiting edge in winter moved into "non-edge" to breed.

None of the 67 species studied was restricted to the South Canadian River floodplain either in winter or in summer--evidence of the absence of distinctive habitat in that area. Each species studied showed preference for vegetation of a particular "life-form" rather than for particular plant species. 129 pages. \$2.00. Mic 57-2958

IODINE METABOLISM IN INSECTS

(Publication No. 21,858)

Lawrence Eugene Limpel, Ph.D.
The University of Wisconsin, 1957

Supervisor: Assistant Professor John E. Casida

A comparative biochemical study was made on iodine metabolism in insects, with particular reference to the American cockroach. The information from this study may be compared with the abundant data available on vertebrate iodine metabolism.

The biochemistry of iodine, after administration of radioiodide, was studied in ten species of insects and fourteen tissues of the American cockroach by means of paper chromatography. The tissue distributions of radioiodide under various conditions, including administration of "thyroid inhibitors" to the roaches, and of labeled 2 (or 4) - monoiodohistidine (MIH), 3,5 - diiodotyrosine (DIT), thyroxine (Tx), methyl iodide, and radiobromide were determined in the American cockroach. The ability of several cockroach tissues to absorb radioiodide from Krebs - Ringer bicarbonate buffer was investigated under various *in vitro* conditions. An examination of the metabolites, including excretory products, of MIH and Tx was made with the aid of paper chromatography. Exuvial excretion of iodine in several species of insects was demonstrated. The biological half-life of radioiodine was determined for the American cockroach.

The iodoamino acids, 3 - monoiodotyrosine (MIT), DIT, Tx, MIH, and possibly 3,5,3' - triiodothyronine (TITH) were found in widely varying amounts in the ten species of insects and fourteen cockroach tissues examined. In the various species of insects, Tx was found at its highest level in the black locust borer and a caterpillar; DIT was very high in a dragon fly and the mud dauber; while MIT was at its highest in a cicada and the larger cabinet beetle. The main sites of Tx localization in the American cockroach were the fat body and the ventral nerve cord. It was found that cuticle was able to selectively concentrate iodide from the blood, and that this ability was enhanced by treatment of the roaches with thiouracil and thiosulfate. Injury of cockroaches (nerve transection) resulted in increased uptake of radioiodide by the nerve cord and the fat body. After administration, labeled MIH, DIT, and Tx were rapidly excreted. The excreta of roaches treated with MIH contained eight radioactive metabolites, three of which were characterized as MIH, diiodohistidine (DIH), and iodide; while excreta of roaches treated with Tx

contained three radioactive metabolites, one of which was characterized as Tx. The unidentified metabolites from both treatments proved quite susceptible to mild alkaline hydrolysis. The *in vitro* studies showed that cuticle, Malpighian tubules, and rat thyroid were able to absorb radioiodide from Krebs - Ringer buffer. Exposure of cuticle to a boiling water bath enhanced its iodide absorption. Thiouracil and resorcinol had no inhibitory effects on iodide absorption by cuticle, while carrier iodide and anaerobic conditions greatly decreased radioiodide absorption. Labeled methyl iodide was subjected to excretion and cuticular absorption. Radiobromide was concentrated by muscle, nerve cord, cuticle, and excretory organs. An organic compound of bromine was found in the American cockroach. The biological half-life of iodide in cockroaches was determined as 26 hours. Some circumstantial evidence was found that Tx may be important physiologically in at least the American cockroach.

Iodine metabolism was shown to be quite variable within the class Insecta. The intermediates of iodine metabolism in insects were found to be similar to those formed in vertebrates. No single cockroach tissue was found which functioned similarly to the vertebrate thyroid in all respects. The effects on cuticular and thyroidal iodide absorption by the inhibitors, excess iodide, thiouracil, thiosulfate, and resorcinol, were similar.

61 pages. \$2.00. Mic 57-2959

THE ANNUAL AVIAN BREEDING CYCLE AT HIGH LATITUDES IN THE CANADIAN ARCTIC

(Publication No. 21,978)

David Freeland Parmelee, Ph.D.
The University of Oklahoma, 1957

Major Professor: Dr. George M. Sutton

From April 16 to September 27, 1955, a study was made of the birdlife of northwestern Ellesmere Island and northern Axel Heiberg Island. The principal area of investigation was the Fosheim Peninsula, the base of operations being the meteorological station Eureka, at 80°00'N., 85°56'W. Twenty bird species bred in the region. Land areas furnished an adequate breeding habitat, but the ocean was so icebound that certain fish-eating alcids had never become established.

Among the 23 forms studied, seven orders, 13 families, and 22 genera were represented. The only genus represented by two species was the gull genus *Larus*. The breeding species occupied a great variety of ecological niches, but they all fitted their reproductive cycle into the short summer period. Four species, the ringed plover, turnstone, knot, and wheatear, wintered in the old world.

Spring arrival continued for 80 days. The snow bunting arrived during a 50-day span, the turnstone and knot during a 6-day span. Some species were paired on arrival, some were not. Most land birds arrived before the thaw. The region had less than two inches of precipitation per year and many slopes remained snow-free all winter. In snowless places newly-arrived birds fed on twigs, buds, seeds, and caterpillars. The turnstone arrived and began egg-laying earlier than is normal for the species at far more

southern latitudes. In general the species which migrated from the old world arrived in advance of those which spent the whole year in the new. Early starting of the reproductive cycle was made possible by the comparative snowlessness of the breeding areas in early June.

Little evidence was obtained that selection has brought about an expeditious establishment of nest territories, unusually rapid nest-building, short incubation and fledging periods, or an overlap of brood-rearing and postnuptial molting in accommodation to brevity of summer at high latitudes. In the snow bunting incubation started before completion of the clutch, and there was some overlap of brood-rearing and postnuptial molting. In the long-tailed jaeger and snow bunting, but not in the rock ptarmigan, turnstone, and knot, hatching extended over a considerable period. One red-throated loon nest, one greater snow goose nest, and two snow bunting nests used in 1955 had been built in a previous year. No evidence of two-broodedness in any species was found.

Fall departure covered a 70-day span. Birds which had not bred left in advance of parent birds and their young. Young of several species reared in the interior moved to the coast before departing. Adult turnstones and knots left the breeding areas and their broods before molting, the females before the males. Many birds had left for the south by early September, nearly all of them by mid-September. Gulls and ducks lingered in open salt water for two weeks after the tundra ponds had frozen shut. No bird remained in the area after October 16 so far as is known.

272 pages. \$3.50. Mic 57-2960

A SYSTEMATIC AND ZOOGEOGRAPHIC SURVEY OF THE NON-MARINE MOLLUSCA OF THE NEW HEBRIDES

(Publication No. 21,948)

George Alan Solem, Ph.D.
University of Michigan, 1956

Since the early 1900's no attempt has been made to study the non-marine mollusca of the New Hebrides. The availability of a large collection of snails from Espiritu Santo Island encouraged the undertaking of a comprehensive survey of the New Hebridean molluscan fauna. Primary effort was directed towards determining the identity of each nomenclatural unit, the delineation of species, and the relationships of the New Hebridean species to those in other areas.

After study of 559 lots of shells, containing about 5000 specimens, seventy-seven species of mollusks were recognized. An additional twenty-five specific names could neither be definitely synonymized nor recognized as valid species because of inadequate descriptions and figures or absence of enough material to establish the limits of specific variation. Fourteen new species and two new subspecies are described; new names are given to two other species.

Little information could be adduced about the zoogeography within the New Hebrides, since only five of the eighty islands have more than ten species of land mollusks recorded from them.

The New Hebridean species were compared with those

found on other Pacific islands by study of the shells, dissection of the soft parts, and reference to systematic monographs and faunal surveys. Approximately 2500 lots of Pacific land snails were examined and over 200 individual dissections made during this investigation. The results of these comparisons indicated that the New Hebridean mollusks have very diverse affinities, and, for the most part, belong to endemic or probably endemic generic or subgeneric taxa. Interpretation of the present distributions of their generic relatives resulted in a survey of the zoogeography of the entire Pacific land molluscan fauna.

The New Hebrides are a transition zone containing elements from several zoogeographic regions. All the New Hebridean species were derived originally from Indonesia and New Guinea, but at several different times. Despite the presence of winds and currents favorable for passive dispersal, the New Hebrides and New Caledonia have very few molluscan genera in common. This evidence, the distribution and fossil record of several relict families, and the slow rate of evolution for land mollusks in the Tertiary suggested that a few New Hebridean taxa are relicts dating from a Jurassic land bridge connecting New Guinea and New Zealand. The hypothesis of a Jurassic land bridge is supported by evidence from New Zealand vertebrates and plants. The remainder of the New Hebridean fauna was derived by a "sweepstakes" route, probably over narrow water gaps between pre-existing high islands, at different intervals during the Tertiary. The New Hebrides have had no dry land connections at all with New Caledonia, and probably none with the Solomons since the Jurassic or early Cretaceous.

The distribution of Pacific land mollusks does not correspond to that shown by other animals, but more closely approximates the regions delineated by phytogeographers. The New Guinea land mollusks are Asian rather than Australian, while the molluscan faunas of southern Australia, New Zealand, and New Caledonia are quite similar.

The conclusions on phylogeny and zoogeography all need testing by further study, since knowledge of the Pacific land mollusca is very incomplete.

497 pages. \$6.35. Mic 57-2961

**THE INFLUENCE OF ENVIRONMENT ON THE
MERISTIC COUNTS OF THE FISHES, *ETHEOSTOMA*
GRAHAMI AND *E. LEPIDUM***

(Publication No. 21,038)

Robert Kirk Strawn, Ph.D.
The University of Texas, 1957

Supervisor: Professor Clark Hubbs

Culture methods for the Rio Grande darter, *Etheostoma grahami* (Girard), and for the greenthroat darter, *E. lepidum* (Girard), are discussed. Data on the ecology and life history of wild and laboratory greenthroat darter populations are presented.

Lateral line scale, anal soft ray, first dorsal ray, second dorsal ray, and left pectoral ray counts of laboratory-raised lots and field populations of the Rio Grande and greenthroat darters are compared. Meristic differences between sexes are small or nonexistent. Means of

natural populations are quite variable, but no definite clines exist. The means of lateral line and pectoral counts of spring populations frequently are significantly lower than those of downstream populations. Adjacent populations may have significantly different means, and the correlation between size and number of lateral line scales within some populations is highly significant. These differences are taken to signify different or changing environments during development. Lots from a single pair raised under different environmental conditions can have means more divergent than those observed in the various populations from their parental geographic region.

The variances of wild populations are similar to those found in laboratory lots. High variances probably correlate with environmental factors rather than genetic differences. The diet of the parents and prolonged nipping of a female by a male correlate with the production of deformed and inviable larvae. The few survivors of these lots tend to be runted and to have highly variable counts. Lack of proper-sized food and/or inability of some larvae to take food as soon as normal fish in the laboratory causes runting and apparently increases the variance of meristic characters. Four lots had extremely high variances of undetermined origin. F_2 interspecific and inter-population lots have high variances demonstrating genetic differences between the parental populations.

All counts appear plastic during the free-swimming stage. The lateral line and probably the first and second dorsal counts are temperature liable until after the adult mode of life on the bottom has been assumed. In a heterogeneous temperature environment the choice of time and place of egg deposition by the parents can influence counts determined before hatching, and temperature preference of the larvae can modify counts which are plastic after hatching.

124 pages. \$2.00. Mic 57-2962

**A GROWTH STUDY IN *AVENA SATIVA*
WITH NEW METHODS**

(Publication No. 21,041)

Oscar F. Wiegand, Ph.D.
The University of Texas, 1957

Supervisor: Professor A. R. Schranck

A theoretical analysis was made of the probable origin of variability of *Avena* coleoptiles employed in elongation and curvature measurements. Inherent or genetic variation is etiologically different and may be distinguished by statistical procedures from the occasional variations encountered in many laboratories. Grounds were found for considering these as the result of uncontrolled environmental conditions in the preexperimental period. Criteria were formulated from published data for the recognition of the degree and type of variations induced. The concurrent effects of humidity, soaking, and red light illumination were tested and a growth method evolved which yields uniform plants consistently.

Comparisons of the growth curves of coleoptiles taken within and between occasions extended the previous observations. The effect of very early light exposures was confirmed.

The growth of intact coleoptiles in red light and in the dark was examined and the light effects shown to be principally localized toward the apex. The differential response of the coleoptiles and other growth characteristics noted do not agree with the conclusion that an endogenous growth rhythm exists in coleoptiles. The data support the view that the sequence of events observed may be due to the interaction of apical auxin and basal food factors.

The design of equipment for the study of excised sections growing vertically permits new observations and experimental approaches to be made. Perfusion techniques were incorporated which do not interfere with gas exchange. The data are uniformly reproducible and confirmatory; in some instances of classical importance (tip regeneration), they stand at variance. The implications are discussed.

The new techniques of vertical growth and perfusion were tested to evaluate the growth characteristics of long sections and the apical effect of red light was reaffirmed.

The effect of citrate buffers on section growth was analyzed and the citrate ion implicated as the growth inhibitor. The effect of citrate buffer is different at the base and apex.

At the concentrations tested, IAA will not stimulate the growth of excised coleoptile sections with intact tips grown vertically and given the auxin during the terminal growth period. The slight increase noted appeared due to the additional water source. The postulation of physiological

regeneration of the tip did not appear warranted and it was proposed that the hydrological consequences of decapitation probably account for recovery-like curves.

The effect of sucrose given basally to sections grown vertically shows that it is not a limiting food factor and even in very high concentration has little effect on growth. This supports the conclusion that IAA behaves like the auxin of coleoptiles, but other factors, probably basal, limit the growth of long apical sections.

The inhibition of growth of excised coleoptile sections due to lack of CO₂ was discovered, and thought to be another instance of non-photosynthetic CO₂ fixation.

A theoretical approach attempting to distinguish local cellular capacities from more extended tissue relationships was tested and a type of epinasty, inhibited by IAA, was induced in very short coleoptile sections.

The design, testing, and calibration of a new micro-respirometer used for the simultaneous observation of growth and respiration of excised tissues is presented. It has been used without modification for standard manometric procedures. The system is suitable for the study of chemical and enzymatic reactions, respiration, and photosynthesis of cell suspensions as well as experimental materials (tissues, small plants, and animals) which are not immersed in media. A simple measuring device permits direct readings of the volumetric changes in the atmosphere of the chambers. Comparative data and applications are submitted. 143 pages. \$2.00. Mic 57-2963

AUTHOR INDEX

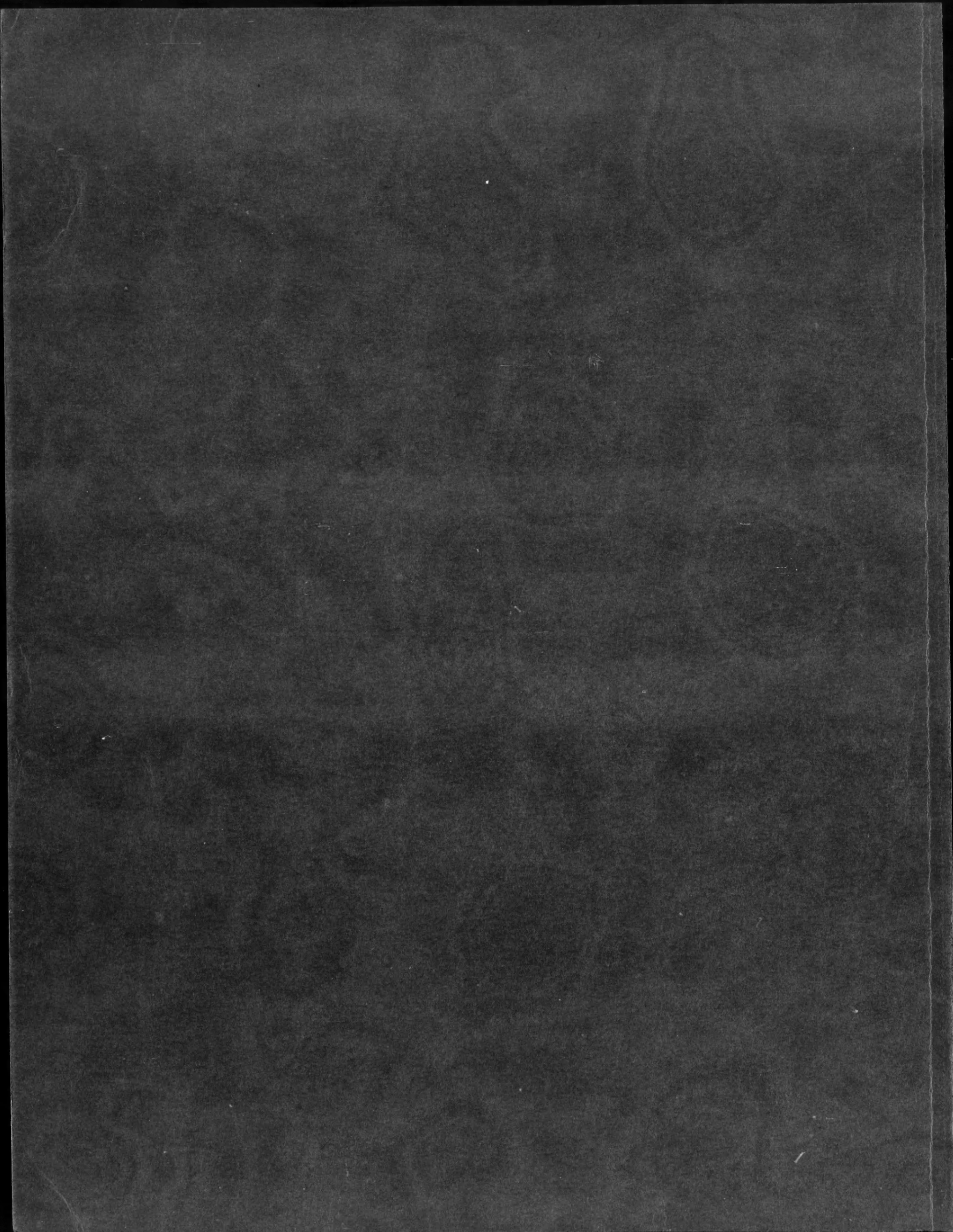
- ABAI, Abai Njoku. Sources for capital formation for economic development in Nigeria. XVII, 1682
- ABIAN, Smbat. Invariants and covariants of systems of linear differential and integro-differential equations. XVII, 1773
- ADELSON, Daniel. Attitudes toward first names: an investigation of the relation between self-acceptance, self-identity and group and individual attitudes toward first names. XVII, 1831
- AINSWORTH, JR., Laban Linton. An exploratory study of the academic achievement of Arab students. XVII, 1702
- ALLEN, Deryle Kenneth. A study of dropouts from the public secondary schools of Oklahoma City for the year 1954-1955. XVII, 1703
- ALTMAN, Carl. Studies of the exchange reaction between chromium(III) and chromium(VI). XVII, 1671
- ANDERSON, Robert Theodore. Attitudes of the pre-exilic canonical prophets toward the cultus. XVII, 1821
- ARENTS, John. A pairwise approach to the problem of many bodies in quantum mechanics. XVII, 1786
- ARNAUD, Sara Hayes. Children of multiple sclerosis: their psychological characteristics. XVII, 1809
- ASCH, Morton Jay. Negative response bias and personality adjustment. XVII, 1704
- ATWOOD, Kenneth Ward. A cathode ray amplifier tube. XVII, 1721
- AUDITORE, Joseph Vincent. Intracellular potassium. XVII, 1780
- AUGUST, Leon Stanley. The electron spectra of Cs¹³³ and Ba¹³⁵. XVII, 1792
- AUVERMANN, Harry John. Mathematical developments applicable to the effect of filters, limiters, rectifiers, and demodulators on phase modulation. XVII, 1791
- BACK, Kenneth Charles. A study of the depressor aftereffects of norepinephrine. XVII, 1780
- BAKER, Elliot. The differential effects of two psychotherapeutic approaches on client perceptions. XVII, 1805
- BANCROFT, Robert Lundy. Ramón Pérez de Ayala: a critical study of his works. XVII, 1759
- BANERJEE, Anil K. Structure and petrology of the Oracle granite, Pinal County, Arizona. XVII, 1729
- BARHAM, William Leon. Flow patterns in cylindrical settling tanks, Part I: application of model analysis technique to settling tank feed well design. XVII, 1717
- BARRON, Arthur S. The effects of three styles of interviewing on the responses of women from two contrasting socioeconomic groups. XVII, 1833
- BAUGH, Nita Emeline Scudder. A Worcestershire Miscellany: compiled by John Northwood, c. 1400, edited from British Museum Ms. Add. 37,787. XVII, 1759
- BEATTIE, Alexander Munro. The advent of modernism in Canadian poetry in English 1912-1940. XVII, 1760
- BECK, Benny Lee. Studies in flame spectrophotometry. XVII, 1658
- BECKER, Mary Misko. The energy expenditure of girls 12 to 14 years of age engaged in activities using the respiration chamber and the Kofranyi-Michaelis apparatus. XVII, 1727
- BERKOWITZ, Lewis Maurice. Studies toward the synthesis of yohimbe alkaloids. XVII, 1661
- BERNERS, Edgar Davis. Deviations from a pure s-wave anomaly in the proton-proton scattering cross sections between 1.4 and 2.1 mev. XVII, 1793
- BHAMBAL, Pratap Vinayak. Social security legislation in the United States, its significance and usefulness for planning social security in India. XVII, 1804
- BLACKBURN, Ruth Harriett. Tudor Biblical drama. XVII, 1746
- BLYTHE, Jack Gordon. The Atoka formation on the north side of the McAlester Basin. XVII, 1729
- BOLLICH, Charles Nelson. Inheritance of several economic quantitative characters in rice. XVII, 1638
- BOND, Walter Dayton. Studies of the formation and separation of certain complex ions of copper, cobalt, and nickel. XVII, 1671
- BOWLES, Romald Edward. Heat transfer from a gas source at temperatures above 5,000° K. XVII, 1723
- BOYD, George Wilson. George Herbert: a reevaluation. XVII, 1747
- BRADLEY, William Arthur. The determination of moments and deflections in plates by the Moiré method and by finite differences with application to the square clamped plate with square cutouts. XVII, 1720
- BRANTL, George Edward. The tragic commitment: an essay in existentialist metaphysics. XVII, 1783
- BRIGMAN, George H. The normal lithium atom. XVII, 1786
- BROHM, John Frank. Burmese religion and the Burmese religious revival. XVII, 1644
- BRUNNER, John Wilson. Hermann Hesse, the man and his world as revealed in his works. XVII, 1760
- BUFFALOE, Neal D. A comparative cytological study of four species of *Chlamydomonas*. XVII, 1649
- BUGELLI, Delmas A. The Montagna Pistolesse: population-supporting characteristics of an Italian Apennine region. XVII, 1728
- BURTON, David Lee. The quality of sweet potato chips as influenced by variety, method of preparation, and storage condition of the roots. XVII, 1637
- BUTLER, Patrick Colin. A study of heavy metal complexing by soil organic matter and its effect on the uptake of heavy metals by plants. XVII, 1641
- CAMPBELL, Robert Wilfred. A decay scheme for Ba¹³¹. XVII, 1793
- CANON, Charles. An analysis of the previous training of high school art teachers with respect to the percept and preference selections of their students. XVII, 1710
- CAPELL, Martin Donald. Transference in the ratings of photographs by normals and neurotics. XVII, 1809
- CARD, Frederick Eli. Diffusion in lead telluride. XVII, 1787
- CARSON, Clarence Buford. Embattled individualists: the defense of the idea of individualism, 1890-1930. XVII, 1734
- CATON, Charles Edwin. A description and evaluation of the method of the ordinary-language philosophers and its doctrinal basis. XVII, 1784
- CHAN, Phillip Chonglin. Metabolic products of L-ascorbic acid. XVII, 1653
- CHEN, Chung Wei. Problems in the application of statistical quality control to a manufacturing plant. XVII, 1684
- CHRISTIAN, James Lee. Arnold Toynbee's concept of man. XVII, 1822
- CHU, Power Yung-Chao. A history of the Hull trade program, 1934-1939. XVII, 1734
- CLARK, Jeanne Gabriel. London in English literature, 1880-1955. XVII, 1761
- CLEMENS, David Henry. The synthesis of 1,4-dialkyl-4-arylpiperidines. XVII, 1661
- COHEN, Gerald. Spectrophotometric studies on the ascorbic acid-ascorbic acid oxidase reaction. XVII, 1653
- COHEN, Morton I. Respiratory neuronal activity in the pons of the cat. XVII, 1794
- COLL, Hans. Spectrophotometric determination of chloride ion. XVII, 1659
- COMBS, William Francis. Judgmental performance of the blind as affected by social and physical stimulus conditions. XVII, 1704
- CONKIN, Paul Keith. Tomorrow A New World: the New Deal community program. XVII, 1735
- COSER, Rose Laub. The role of the patient in a hospital ward. XVII, 1834
- CRABTREE, Margaret Cooper. The construction and trial study of a language development test for children up to three years of age. XVII, 1713
- CRAWFORD, JR., Evans Edgar. The leadership role of the urban Negro minister. XVII, 1822
- CURLEE, Joan Ethelyn. Some aspects of the New Deal rationale: the pre-1936 writings of six of Roosevelt's advisers. XVII, 1736
- CURRY, William Lee. Comstockery: a study in the rise and decline of a watchdog censorship; with attention particularly to the reports of the New York Society for the Suppression of Vice, to magazine articles and to news items and editorials in the New York Times, supplementing other standard studies on Comstock and censorship. XVII, 1747
- DAILEY, Kenneth Irving. The Russian Provisional Government of 1917. XVII, 1737
- DAJANI, Nijmeddin Izzat. Economic appraisal of the Yarmuk Jordan Valley project. XVII, 1682
- DARNELL, Walter Thomas. A study of methods for obtaining uniform straight-line air flow in spray dryers. XVII, 1718
- DAS GUPTA, Sushil. A critical study of methods of solving power system transient stability problems. XVII, 1722
- DAUM, Arnold R. The illumination revolution and the rise of the petroleum industry, 1850-1863. XVII, 1737
- DAVIDSON, Raymond Alonzo. Time lag of ionization behind ultra-speed pellets. XVII, 1722
- DAWIS, René V. The measurement of supervisory attitudes: an exploratory study. XVII, 1806
- DAY, Edgar Allan. Identification of some off-flavor compounds from gamma radiated skim milk. XVII, 1639
- DENGLER, Herbert Peter. Ion distribution during electrolysis. XVII, 1718
- DENNY, D. Paul. Nitration of the benzene-sulfonate of 2-hydroxybiphenyl. XVII, 1662

- DIENER, Charles L. A comparison of over-achieving and under-achieving students at the University of Arkansas. XVII, 1692
- DINELLA, Renald Robert. A study of the chemical, physical, and kinetic properties of intestinal lipase. XVII, 1654
- DIXON, Glen Jackson. Radioactive phosphorus studies on resting and contracting mammalian muscle. XVII, 1654
- DOLAN, Anne Marie. The literary salon in New York, 1830-1860. XVII, 1748
- DORSEY, Robert Nicholson. An investigation of the stability of social sensitivity and its relationship to verbal behavior. XVII, 1810
- DRIVER, Tom Faw. The sense of history in Greek and Shakespearean dramatic form. XVII, 1748
- DROZIN, Vadim George. The determination of the particle size distribution of aerosols by precipitation of charged particles. XVII, 1791
- ELLENBOGEN, Maximilian. A study of foreign words occurring in the Hebrew and Aramaic of the Old Testament. XVII, 1758
- EMERICK, Royce Jasper. I: The effect of trace minerals dicalcium phosphate and phenothiazine on the resistance of grazing lambs to *Haemonchus contortus* infection. II: Studies of the effects of certain stress factors on the resistance of lambs to *Haemonchus contortus* infection. XVII, 1655
- ENGEL, Mary. The stability of the self-concept in adolescence. XVII, 1810
- ENGLE, Harold Edward. A critical study of the functionalist approach to international organization. XVII, 1798
- ETTER, JR., Raymond Lewis. The utilization of α -oximino ketones in the Pfitzinger reaction. XVII, 1662
- EVANS, Betty Douglas. Dryden's imagery in his nondramatic poetry. XVII, 1749
- FAKHOURY, A. Fattah. The determination of steady flow and pulsating flow performance for an impulse turbine with partial admission. XVII, 1724
- FARR, Charles Henry. A study of the 'artificially-induced' and 'natural' Lupus Erythematosus cell phenomena. XVII, 1781
- FAYEMI, Abraham Adeboyejo Agbolade. Evaluation of techniques for studying root development of corn (*Zea mays* L.) plants. XVII, 1642
- FEINBERG, Gerald. Meson production in nucleon-nucleon collisions. XVII, 1787
- FELDBSTEIN, Leonard Charles. The norms of science. An evaluation of the views of Meyerson, Duhem and Peirce. XVII, 1784
- FLEWELLEN, JR., William Crawford. Current concepts on cost as a basis for depreciation. XVII, 1687
- FINLAY, Peter Stevenson. *Toxoplasma* in wild birds. XVII, 1839
- FLETCHER, Paul C. The spin and quadrupole moment of I^{129} and the magnetic moment of I^{131} . XVII, 1788
- FOSTER, Edward Francis. A study of grim humor in the works of Poe, Melville, and Twain. XVII, 1761
- FREUDENBERGER, Herman. A case study of the government's role in economic development in the eighteenth century: the Brno fine-cloth factory. XVII, 1690
- FRIEDRICH, Robert Winslow. An exploratory study of altruism. XVII, 1832
- FULMER, Clyde Benson. Fission fragment studies by magnetic analysis. XVII, 1793
- FUQUA, JR., Samuel Agee. I. The mono-keto- and monohydroxytetradecanoic acids. II. A method for the synthesis of long-chain odd-carbon dicarboxylic acids. The synthesis of nonacosanedioic acid. XVII, 1663
- GAREAU, Frederick Henry. A critical examination of United States policy toward German industrial disarmament (1943-1955). XVII, 1799
- GAZITH, Moshe. The kinetics of the thermal and photochemical exchange between benzyl iodide and iodine in hexachlorobutadiene-1,3 solutions. XVII, 1672
- GEORGE, Jane Pippin. A study of the patterns of social interaction at the senior high school level and their relationship to certain selected factors. XVII, 1705
- GOLD, Bertram. Some differences between accepted and rejected members of effective and ineffective groups. XVII, 1832
- GOLDBECK, JR., Benno Theodor. 8-Rings in minimal maps. XVII, 1774
- GOLDSTEIN, Leo S. The relation of quantity of information to quality of solution of a practical field problem. XVII, 1806
- GOLDSTEIN, Sidney. An economic appraisal of aggregate labor turnover in manufacturing. XVII, 1683
- GOODE, Monroe Jack. Physiological specialization in the cucurbit anthracnose fungus *Colletotrichum lagenarium*. XVII, 1642
- GOSNELL, Rex B. Chemistry of the triphenylmethyl group (Parts I-III). XVII, 1663
- GOWER, Herschel. Traditional Scottish ballads in the United States. XVII, 1750
- GRADONI, Ettore John. A survey of selected distributive education programs in New York State: a study of specific cooperative part-time retailing programs based on personal visitation and observation at schools and training stations. XVII, 1714
- GREGG, Robert LeRoy. America's Town Meeting of the Air, 1935-1950. A critical and rhetorical analysis. XVII, 1838
- GREEN, Leah Ann. A study of creativity and the self-attitudes and sociability of high school students. XVII, 1807
- GUMMEL, Hermann Karl. Thermal capture of electrons in silicon. XVII, 1788
- HALE, Charles Adams. The problem of independence in Mexican thought, 1821-1853. XVII, 1738
- HALLIGAN, Margaret Theresa. Anglo-Irish relations, 1921-1939. XVII, 1738
- HALPERT, Inge D. Hermann Hesse and Goethe with particular reference to the relationship of *Wilhelm Meister* and *Das Glasperlenspiel*. XVII, 1762
- HAMM, Thomas Edward. Some applications of o-aminobenzenethiol in inorganic analysis. XVII, 1659
- HANSON, Howard Gordon. The origin of the legend of the Holy Grail. XVII, 1750
- HARTIN, John Sykes. The southeastern United States in the novel through 1950: a bibliographic review. XVII, 1771
- HEIMER, Ralph. Sialic acid containing compounds, their degradation, and the structure of sialic acid. XVII, 1656
- HEINLE, Edwin Christian. The eighteenth century allegorical essay. XVII, 1763
- HENRY, Sarah Snowden. A study of the antibodies produced in response to purified preparations of ovine interstitial cell-stimulating hormone. XVII, 1781
- HENSLEY, Horace Gene. A comparative study in problem solving of bright and dull children. XVII, 1706
- HERRMANN, Raymond Anthony. Reactions between 2-iodobutane and iodine in solution. XVII, 1873
- HIBBARD, Robert Bruce. The life and ministry of Ralph Washington Sockman. XVII, 1823
- HIRSCH, Abraham Meno. International rivers in the Middle East: a hydro-political study and a legal analysis. XVII, 1799
- HOLSTEN, John Robert. Some alkylation reactions of Grignard reagents of sulfones. XVII, 1664
- HORNE, Ralph Albert. Anion catalysis and the effect of alcoholic media on the iron(II)-iron(III) electron exchange reaction. XVII, 1873
- HUNEKE, Harold Vernon. Some properties of the Nörlund methods as an ordered set. XVII, 1774
- HUSAIN, Akhtar. Mode of pathogenesis of the Granville wilt bacterium, *Pseudomonas solanacearum*. XVII, 1649
- IVERSEN, Kenneth William. A critical evaluation of claims regarding the relationship between soil composition and human health. XVII, 1732
- JACKSON, William Addison. Carbon dioxide fixation by plant roots and its influence on cation absorption. XVII, 1650
- JACOBS, Mildred O. A validation study of the Oral Erotic Scale of the Blacky Pictures Test. XVII, 1811
- JANIS, Allen Ira. Coordinate conditions and true observables. XVII, 1788
- JOHN, Elizabeth Ann Harper. Spanish relations with the *Indios bárbaros* on the northernmost frontier of New Spain in the eighteenth century. XVII, 1739
- JOHNSON, Alice Evangeline. A critical analysis of the dislocated character as developed in the major novels of Henry James. XVII, 1763
- JOHNSON, JR., John Christopher. Habitat preferences among representative wintering and breeding birds of the central Oklahoma forest-prairie ecotone. XVII, 1840
- JOHNSON, Robert Clyde. A study of the problem of criterion or theological authority in selected contemporary theologians. XVII, 1824
- JOLY, Jean-Marie. The influence of word identification ability on group verbal intelligence test scores. XVII, 1706
- JONES, Major J. The place of God in the educative process according to George A. Coe, William C. Bower, and Harrison S. Elliott. XVII, 1824
- JORDAN, JR., Harold Vernon. Studies on the lactobacilli from the oral cavity of the albino rat. XVII, 1647
- KAHN, Charles Harry. Personal deductions in the individual income tax. XVII, 1688
- KARL, Frederick Robert. Joseph Conrad: a modern Victorian (a study in novelistic technique). XVII, 1764

- KEMP, Bernard Allen. The merger component in the growth of a firm. XVII, 1684
- KENNEDY, SR., Amos Paul. Performance and carcass characteristics in individually fed steer and heifer calves. XVII, 1639
- KIERNAN, Bernard P. A history of international master chess: 1851-1914: a study in modern institutional history. XVII, 1733
- KING, Charlyce Ross. Attitudes of college women toward student organizations at The University of Oklahoma. XVII, 1693
- KINSOLVING, May Risch. On spaces suitable for Finsler geometries "in the large." XVII, 1775
- KIRBY, Lynn J. A polarographic and spectrophotometric investigation of the lower oxidation levels of rhenium. XVII, 1673
- KLEIN, Richard L. Osmotic and metabolic studies on mitochondria isolated from *Acanthamoeba* sp. XVII, 1794
- KRIKORIAN, Esther. Anisotropy of infrared absorption in a single crystal of acetylene. XVII, 1674
- KOLBERT, Jack. Edmond Jaloux and his literary criticism. XVII, 1764
- KOLSTAD, Charles Kenneth. The effect of pH on the gastro-intestinal absorption of salicylate in rats. XVII, 1782
- KRAEMER, Alfred J. Transfer of training as a function of place and response learning. XVII, 1818
- KURTH, Gertrud Maria. The anticipation of the decline of life as a function of psychological variables. XVII, 1812
- LABARRE, JR., Anthony Edward. Differential calculus in Hilbert spaces. XVII, 1776
- LANE, Elizabeth Carolina. The effect of a program of neuro-muscular re-conditioning on the amount of energy expended during standardized walking. XVII, 1702
- LANGSJOEN, Sven Verner. Aspects of Klopstock's sentimentality. XVII, 1765
- LARKIN, Emmet J. James Larkin and the Irish labour movement, 1876-1914. XVII, 1739
- LAVERTY, Ruth. A pilot study of Protestant Church-related social welfare in the U.S.A.: a national survey of social welfare agencies sponsored, operated or related to the Protestant denominations. XVII, 1834
- LAY, Archie Wilson. A study of the influence of an interest inventory on choice of major and subsequent academic behavior. XVII, 1707
- LEE, Dorothy Elizabeth. Changing objectives in business education on the collegiate level in the United States from 1899 to 1954. XVII, 1714
- LEONE, Joseph Thomas. Mechanisms of electrochemical reduction of phenyl ketones. XVII, 1660
- LEVI, Isaac. Positivism and realism in the epistemology of Moritz Schlick. XVII, 1785
- LEVINE, Samuel. The kinetics of the exchange of iodine with iodobenzene and p-nitroiodobenzene. XVII, 1675
- LEVY, Alfred Jacob. Nathaniel Hawthorne's attitude toward total depravity and evil. XVII, 1751
- LIEBERMAN, Harold. Characteristics and citizenship activities of graduates of Ohio Northern University. XVII, 1693
- LIGENZA, Joseph Raymond. The triiodide ion complexes of amylose and of the Schardinger dextrans. Theoretical and experimental. XVII, 1675
- LIMPEL, Lawrence Eugene. Iodine metabolism in insects. XVII, 1840
- LIVINGSTON, Wilbur DuBose. An evaluation of requirements for the certification of secondary-school teachers. XVII, 1694
- LONG, Jared Quitman. Professional laboratory experiences in physical education. XVII, 1711
- LOWE JR., Frederick W. Gertrude's Web: a study of Gertrude Stein's literary relationships. XVII, 1766
- LUEDEMANN, George Miller. A study in the genus *Peyronellaea*. XVII, 1650
- MAHAVIER, William S. A theorem on spirals in the plane. XVII, 1776
- MAILLOUX, Kenneth Frank. The Boston Manufacturing Company of Waltham, Massachusetts, 1813-1848: the first modern factory in America. XVII, 1740
- MALOUF, Carling Isaac. The cultural connections between the prehistoric inhabitants of the Upper Missouri and Columbia River systems. XVII, 1645
- MAMANTOV, Gleb. Anodic stripping voltammetry and other studies of electrode processes. XVII, 1676
- MANDEL, Morton. The microwave spectra of the TI halides, GaBr and GaI. XVII, 1676
- MANNEY, Agnes Ann. The temporal orientation of the retarded reader. XVII, 1708
- MARTIN, David Glenn. Some applications of the Michael condensation to steroid synthesis. XVII, 1664
- MASINGILL, Eugene Frank. The diplomatic career of Henry Lane Wilson in Latin America. XVII, 1741
- MATHEWS, Thomas G. Puerto Rican politics and the New Deal. XVII, 1741
- MAZLISH, Constance Shaw. Ortega and Spain. XVII, 1766
- MAZUR, Paul. Lattice vibrations in sodium chloride type structures. XVII, 1788
- McCAUGHEY, Margie (Buntain). The effect of cortisone and other anti-inflammatory agents upon transaminase activity of rat tissue. XVII, 1656
- McCLURE, Major L. Legislative controls over the public school curriculum. XVII, 1694
- McGILL, Paul Lewis. Detonation pressures of stoichiometric hydrogen-oxygen mixtures saturated with water at high initial temperatures and pressures. XVII, 1719
- McGINN, Clifford James. The degradation of certain carbohydrates by periodic acid. XVII, 1665
- McGUINNESS, John Seward. Top-management organization and control of insurance companies. XVII, 1685
- McGINNIES, Rosemary Thorndike. On the validity of the assumption of two-body interactions in molecular physics. XVII, 1789
- McLELLAN, JR., William Leonard. Metabolic reactions in erythrocyte ghosts. XVII, 1657
- MECHNER, Francis. Probability relations within response sequences under ratio reinforcement. XVII, 1819
- MEIER, August. Negro racial thought in the age of Booker T. Washington, circa 1880-1915. XVII, 1837
- MELNIKER, Robert C. Self-acceptance and the mechanism of identification: a Q-sort investigation of the relationship between levels of self-acceptance, character, parental descriptions and identification patterns in college women. XVII, 1812
- MENCHER, Samuel. The relationship of voluntary and statutory welfare services in England. XVII, 1836
- MENDENHALL, 3rd., William. Estimation of parameters of mixed exponentially distributed failure time distributions from censored life test data. XVII, 1776
- MENGERS, Ethan Theodore. The idea of creation in the Old Testament. XVII, 1825
- MEYER, Robert Paul. The geologic structure of the Cape Fear axis as revealed by refraction seismic measurements. XVII, 1730
- MILLER, Beulah Eglantine. Civil liability and nursing: an investigation of judicial decisions involving the practice of nursing by registered nurses in the state of New York during the first half of the twentieth century. XVII, 1731
- MILLER, Donald Wright. The structure of uniform semigroups. XVII, 1777
- MOTT, Johanna K. Religious interests of college students at The University of Oklahoma. XVII, 1827
- MILLER, Robert Frank. Measurement and interpretation of potential distributions in photoconductive CdS. XVII, 1792
- MILLER, Robert L'Hommedieu. The educational philosophy of the New Beacon Series in Religious Education. XVII, 1826
- MINCER, Jacob. A study of personal income distribution. XVII, 1691
- MINYARD, Alfred Benson. The theology of Phillips Brooks. XVII, 1826
- MOLL, Robert Harry. The inheritance of brown spot resistance in corn. XVII, 1648
- MOORE, Sally Falk. Inca law and government. XVII, 1645
- NATOLI, Rosetta Victoria. Acidities of strong acids in nitromethane. XVII, 1676
- NEAL, Fred Warner. The reforms in Yugoslavia, 1948-1954: Titoism in action. XVII, 1797
- NELSON, F. William. An analysis of John Dos Passos' U.S.A. XVII, 1767
- NELSON, Richard Sanborn. An airport for Austin—a comparative study. XVII, 1686
- NESMITH, Richard Duey. The development of the concept of the responsible society: Stockholm to Evanston. XVII, 1828
- NICHOLS, John Richard. The experimental test of a general theory of addiction. XVII, 1819
- NOFFSINGER, Terrell L. Growth patterns within some inbred lines of Chester White and Yorkshire breeds of swine. XVII, 1640
- NORMAN, Richard Arthur. Reading aloud and extemporaneous speaking on the radio. XVII, 1838
- NÚÑEZ, Benjamín. Terminos topograficos en la Argentina colonial (1516-1810). XVII, 1751
- O'DONNELL, Charles Robert. The Mind Of The Artist: Cooper, Thoreau, Hawthorne, Melville. XVII, 1752
- O'DONNELL, Thomas Francis. The regional fiction of upstate New York. XVII, 1752
- OLDHAM, Francis Herbert. Youth hostel-ing as a school and community youth service program. XVII, 1695
- OLSON, Ray Willard. A comparison of mental deterioration and intellectual functioning in senescent and brain-damaged subjects. XVII, 1813
- ORY, Horace Anthony. Luminescence and the effects of the electronic excitation of organic molecules. XVII, 1677
- PARKS, Edna Dorintha. English hymns and their tunes in the sixteenth and seventeenth centuries. XVII, 1778
- PARKER, Franklin. George Peabody, founder of modern philanthropy (Volumes One - Three). XVII, 1701

- PARMELEE, David Freeland. The annual avian breeding cycle at high latitudes in the Canadian arctic. XVII, 1841
- PASEWARK, Richard Arthur. The use of finger paintings in differentiating epileptics and paranoid schizophrenics: an evaluation of the identification hypotheses underlying the Szondi Test. XVII, 1814
- PAUL, Albert Peter. Studies toward the synthesis of strychnos alkaloids. XVII, 1666
- PELLON, Joseph. Polymerization at high pressures: investigation of the pressure effect on the individual steps of an addition polymerization process. XVII, 1677
- PERKINS, Jean Ashmead. Diderot and La Mettrie. XVII, 1753
- PILTZ, Robert Joe. Problems in validity for The Copple Sentence Completion Test as a measure of "effective intelligence" with Air Force personnel. XVII, 1814
- POPE, Hughlan William. The swamping catalyst effect in bromination of aromatic carbonyl compounds. XVII, 1666
- PORTER, John Allen. Part I. Studies of complexes in the aqueous uranium(VI)-carbonate-bicarbonate system. Part II. The separation and purification of lithium from sodium by continuous countercurrent ion exchange. XVII, 1678
- PRICE, Phil B. Reproduction and growth in various lily species following X- and gamma-irradiation of pollen and X-irradiation of seeds. XVII, 1650
- PRZYBIELSKI, Benon H. J. The radiation induced oxidation of hydroquinones in aqueous solutions. XVII, 1657
- QUALTERE, Thomas John. An investigation of the relationship between visual figure-background disturbance and performance on Raven's Progressive Matrices test in cerebral palsy children. XVII, 1708
- RAAFAT, Aly Ahmed. Reinforced concrete and the architecture it creates. XVII, 1726
- RAKOWITZ, David Henry. Studies of the chemistry and formation of certain aluminum soaps. XVII, 1678
- RANDALL, Randolph. James Hall: a biography. XVII, 1754
- READ, Lawrence F. The Ferndale school-community controversy—a case study of the resolution of school-community tensions. XVII, 1698
- REPKA, JR., Benjamin Charles. The question of rearrangements in the acetolysis of secondary alkyl derivatives (Sections I-IX). XVII, 1667
- REUSCH, William H. Conformational effects in some 1-keto-hydrophenanthrenes. XVII, 1667
- REYNOLDS, JR., Elbert Brunner. The influence of method of junction formation and heat treatment on the electromotive force produced by a thermocouple. XVII, 1724
- REYNOLDS, Jack Quentin. Historical and current issues in racial integration in the public schools of Arkansas. XVII, 1696
- REYNOLDS, Mildred May. The identification of the needs of senior citizens and an analysis and critique of selected programs designed to meet these needs. XVII, 1700
- RILEY, Bob Cowley. A study of the education of the young and adult blind in Arkansas with recommendations for an improved program. XVII, 1699
- RIPPY, Frances Mayhew. Matthew Prior and Alexander Pope: their personal and literary relationship. XVII, 1754
- ROBERTS, JR., Charles Alfred. The validity of Tomonaga's method of intermediate coupling. XVII, 1789
- ROBERTS, Ruth Eloise. Welsh place-names in the earliest Arthurian texts. XVII, 1755
- ROBINSON, Dean Boundy. Verticillium wilt of potato in relation to symptoms, epidemiology and variability of the pathogen. XVII, 1643
- RODGERS, Edelbert George. The relationship of certain measurable factors in the personal and educational backgrounds of two groups of Baltimore Negroes, identified as superior and average in intelligence as fourth grade children, to their educational, social and economic achievement in adulthood. XVII, 1709
- ROGERS, Katharine Munzer. Jonathan Swift's attitude toward women. XVII, 1767
- ROEHRRIG, William Cruden. The influence of area and portion of the retina stimulated on the critical flicker-fusion threshold. XVII, 1820
- ROLL, Frederic. Creep and creep-recovery of plain concrete under high compressive stresses. XVII, 1721
- ROSENBERG, Robert. Many-valley theory of free-carrier absorption in N-type germanium. XVII, 1789
- ROSSI, Alice S. Generational differences in the Soviet Union. XVII, 1837
- ROWLAND, Albert Westley. A study of three selected factors in the public relations programs of colleges and universities in the United States. XVII, 1712
- ROY, Joy Benjamin. A psycho-social study of group interaction of physically handicapped and able-bodied children. XVII, 1815
- RUDY, Peter. Young Leo Tolstoy and Laurence Sterne. XVII, 1756
- RUNDELL, JR., Walter. The U. S. Army's currency management in World War II. XVII, 1742
- RUSSELL, Allan Melvin. The rotational magnetic moments of Li^6F and Li^7F . XVII, 1790
- SACHS, William S. The business outlook in the Northern colonies, 1750-1775. XVII, 1690
- SAID, Abdul Aziz. The operation of international trusteeship. XVII, 1800
- SALMONSON, Roland Frank. Auditing standards, the law and third parties. XVII, 1686
- SANDERS, Joseph Enloe. Major theological beliefs of the Churches of Christ and their implications for Christian education. XVII, 1828
- SARGENT, John Winthrop. The synthesis of 9-hydroxy-2-azabicyclo(3.3.1)nonane and the stereochemistry of some polycyclic substituted cyclohexanes. XVII, 1668
- SAVET, Gabrielle. André Suarès, critique. XVII, 1768
- SCHREIBER, Robert James. The development of procedures for the evaluation of educational methods used in accident prevention. XVII, 1696
- SCHMATZ, Teresa. The membership of dependencies in international organizations in the field of communications. XVII, 1801
- SCHONTHAL, Aviva H. The symbolist poetics in the *Mercure de France* (1890-1905). XVII, 1768
- SCHUTZ, Richard Edward. Patterns of personal problems of adolescent girls. XVII, 1808
- SEGAL, Bernice Ginsberg. Space group analysis of crystal coupling effects in paramagnetic resonance spectra. XVII, 1679
- SENIOR, John. The occult in nineteenth-century symbolist literature. XVII, 1769
- SERGEANT, Tom Paul. Factors influencing growth initiation of *Bacillus globigii*. XVII, 1647
- SEWELL, George Alexander. Jesus amidst the tensions of Palestinian Judaism as viewed in the Synoptic Gospel records. XVII, 1829
- SHAKE, James Curtis. Devising a test to measure some areas of difficulty in reading piano music. XVII, 1779
- SHEA, George Tyson. The Japanese proletarian literary movement, theory and fiction: 1921-1934. XVII, 1770
- SHENKENBERG, David Richard. Effects of ultrasonic waves on the heat stability and flavor of milk. XVII, 1727
- SHINODA, Minoru. The founding of the Kamakura Shogunate, 1180-85: based on the *Azuma kagami*. XVII, 1733
- SIKES, Herschel M. William Hazlitt's theory of literary criticism in its contemporary application. XVII, 1770
- SILBERMAN, Bernard S. The democracy movement in Japan: 1916-1921; a history of a social movement. XVII, 1743
- SIMON, Walter B. The political parties of Austria. XVII, 1797
- SILVER, Irving Herman. Attitudes toward the self and others of a group of psychoanalysts. A determination of the relationship between attitudes toward self and toward others and human and human-like responses on the Rorschach. XVII, 1815
- SMITH, Harold Franklin. A study of the rates of rearrangement of the *meta*- and *para*-haloacetophenone oximes. XVII, 1668
- SMITH, JR., Riley Seymour. A study of the Chinle-Shinarump beds in the Leupp-Holbrook area, Arizona. XVII, 1730
- SMITH, Robin Nelson. The evaluation of a less structured form of interest test item. XVII, 1709
- SOLEM, George Alan. A systematic and zoogeographic survey of the non-marine mollusca of the New Hebrides. XVII, 1841
- SPARKS, Paul Emerson. An evaluation of two methods of teaching reading. XVII, 1712
- SPEAIRS, JR., Richard Kirk. A taxonomic study of *Tremella* in North America. XVII, 1651
- SPRAGUE, Charles Henry. The synthesis of fluoro-bromo derivatives of benzoic acid to be evaluated as radiographic opaques. XVII, 1782
- STEELE, Henry Benton. A study of the community participation of industrial education teachers of Houston, Texas. XVII, 1699
- STELMACH, Zenobius. Bromine retention in soils and uptake of bromine by plants after soil fumigation. XVII, 1637
- STEPHENSON, Robert Lloyd. Accokeek: a Middle Atlantic Seaboard Culture sequence. XVII, 1646
- STEPPUHN, Diether. Der Beobachter; seine Stellung und seine Bedeutung; eine völkerrechtliche Untersuchung als Beitrag zum Studium der Struktur der Internationalen Organisation (The Observer—Position And Significance, a study in international public law as a contribution to the study of the structure of international organization). XVII, 1801
- STERLING, Elwyn Franklin. The theory of long prose fiction in France, 1750-1830. XVII, 1771
- STERNESHER, Bernard. Rexford Guy Tugwell and the New Deal. XVII, 1743
- STEWART, Edward Charles Pereira. A quantitative study of the Gelb effect. XVII, 1809
- STOTT, Richard Lavon. Sexual conflict, perceptual vigilance and perceptual defense in visual perception. XVII, 1816
- STOUTAMIRE, Donald Wesley. Studies on the synthesis and stereochemistry of the 16 keto isomers of estrone. XVII, 1669

- STRAWN, Robert Kirk. The influence of environment on the meristic counts of the fishes, *Etheostoma grahami* and *E. lepidum*. XVII, 1842
- STRAUSS, Gerald. *Germania illustrata*: topographical-historical descriptions of Germany in the sixteenth century. XVII, 1744
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DISSERTATION ABSTRACTS

Volume XVII, No. 9

1957